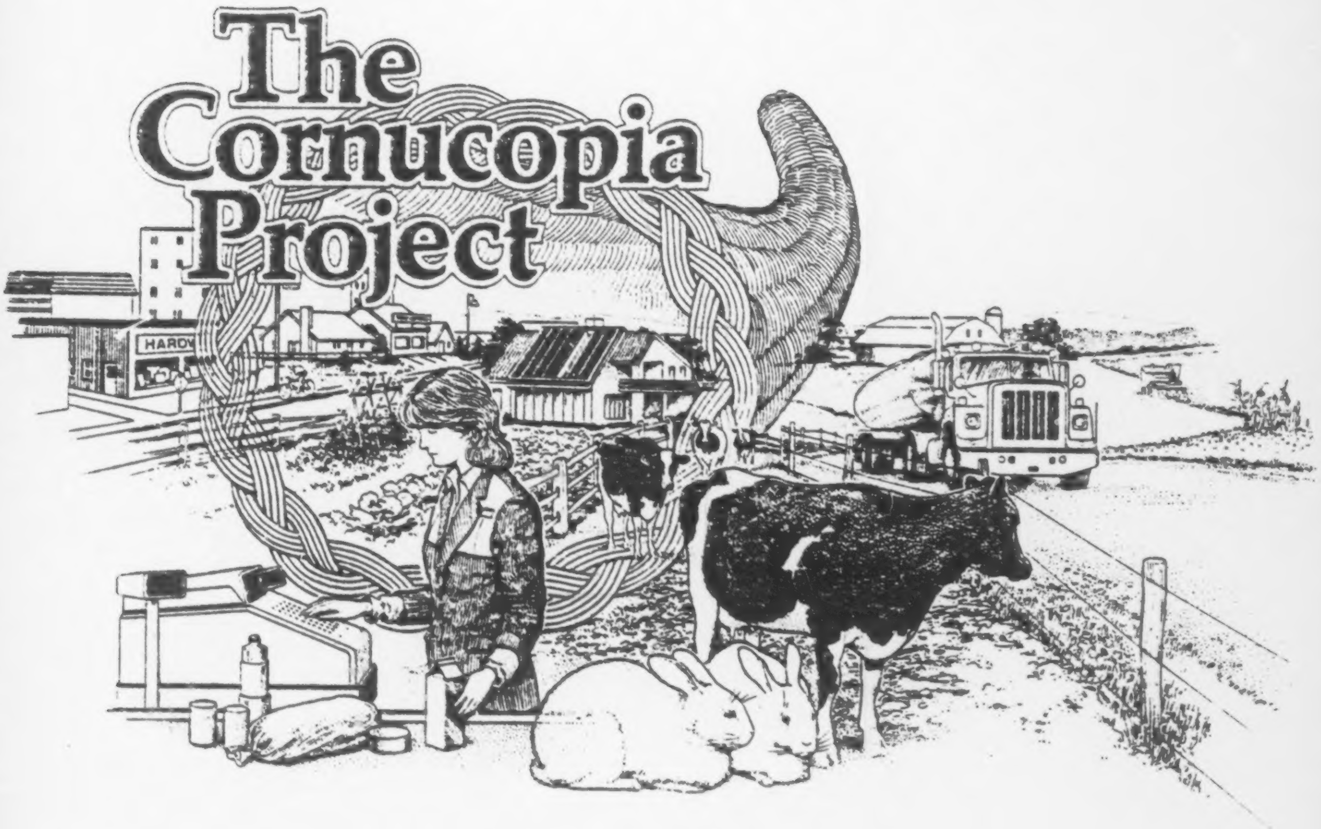
C8111-1.14



THE FOOD SYSTEM IN CALIFORNIA:
Problems and Prospects in the Land of Plenty

by
ELLEN PAHL
of
The Cornucopia Project of Rodale Press
with the research assistance of Jeff Klein

The Cornucopia Project of Rodale Press
33 East Minor Street
Emmaus, Pennsylvania 18049
(215) 967-5171

March 1983

BEST AVAILABLE COPY

THE FOOD SYSTEM IN CALIFORNIA:
PROBLEMS AND PROSPECTS IN THE LAND OF PLENTY

By

Ellen Pahl

of

The Cornucopia Project of Rodale Press
with the research assistance of Jeff Klein

The Cornucopia Project
Rodale Press, Inc.
33 East Minor Street
Emmaus, Pennsylvania 18049

TABLE OF CONTENTS

PREFACE 1

INTRODUCTION 2

FOOD IMPORTS/EXPORTS 6

    Livestock and Poultry 10

LAND USE/SOIL ABUSE 11

WATER 16

FARM SIZE, NUMBERS, OWNERSHIP 24

ECONOMICS OF FARMING 28

FERTILIZERS 31

PESTICIDES 32

FOOD INDUSTRY 35

FOOD AVAILABILITY 37

FISHERIES AND MARINE RESOURCES 39

RECOMMENDATIONS 41

WHAT HAS BEEN DONE 65

FOOTNOTES 70

APPENDIX 83

    Food Imports Chart 84

    Notes to Imports Chart 91

    Food-Related Organizations for Consumers 92

PREFACE

The Cornucopia Project of Rodale Press has been examining the food system of the United States on national, state and local levels, looking into, among other things, economic structure, supply vulnerability, soil erosion and compaction, loss of farmers and farmland, farm debt, the use of expensive energy, water, fertilizers and pesticides and their environmental impacts.[1] These concerns threaten the sustainability of our food system and health and well-being of the entire nation. This is a study of California's food system and agricultural industry.

California, the nation's leading agricultural state, plays a vital role in keeping America fed. This report, compiled through extensive research, interviews and consultations is an analysis of the state's food production and distribution system in an era of increasing costs and dwindling supplies of resources. California agriculture and food issues are extremely complex. Books have been written on the economics of California agriculture, on the politics of water and resource management, on labor policy, and on many other issues addressed in this study. We do not expect or hope to have the last word here. Rather, we hope to present a unique way of looking at, thinking about and changing California's food system so that it may become more sustainable.

Many of the understandings and recommendations presented here are based upon the work of people long involved with and committed to California food and agricultural issues. Special thanks go to Gil Friend, Kim Mueller, Len Duhl, Don Rothenberg, Professor George Morgan and Professor Robert Jay.

INTRODUCTION

California's agriculture has been immensely successful. California leads the nation in gross cash farm receipts. Farmers in the state, just 3 percent of the nation's total, received $13.7 billion, 10 percent of the national gross cash receipts from farming in 1980.[2] Approximately 10 percent of what goes into every shopping basket in the country comes from California.[3] The state supplies the nation with 45 percent of its fresh vegetables and 53 percent of processed vegetables.[4] California accounts for 50 percent of the nation's cash receipts for fruit and nuts and 33 percent of that for vegetables.[5] Agriculture in California is considered one of the most diversified in the world, with no single crop dominating the state's farm economy. Milk and cream, the leading commodity in 1980, accounted for only 12.8 percent of the state's total agricultural value. Most crops individually account for less than 2 percent of the state's total gross farm income. California leads the nation in 49 commercial crop and livestock commodities.[6] (See Table 1). That's the good news.

Table 1

CROP AND LIVESTOCK COMMODITIES IN WHICH CALIFORNIA LEADS THE NATION

Alfalfa Seed
Almonds
Apricots
Artichokes
Asparagus
Avocado
Broccoli
Brussels Sprouts
Cantaloups
Carrots
Casaba Melons
Cauliflower
Celery
Chili Peppers
Cranshaw Melons
Cut Flowers
Dates
Eggs
Figs
Garlic
Grapes
Honeydew Melons
Kiwi
Ladino Clover Seed
Lemons
Lettuce
Lima Beans
Mushrooms, F.M.
Nectarines
Nursery Products
Olives
Onions
Oriental Vegetables
Peaches
Pears
Persian Melons
Persimmons
Pistachios
Plums
Pomegranates
Potted Plants
Prunes
Rabbits
Safflower
Spinach
Strawberries
Sugar Beets
Tomatoes, Proc.
Walnuts

Source: State of California, Department of Food and Agriculture, California Agriculture-1980, p. 3.

The bad news is that despite this incredible success, California imports 41 percent of the food consumed by its residents. The transportation cost alone for this imported food is $439 million. While $8.8 billion is spent on food brought in from out-of-state each year, $7 billion actually leaves the state (the other 20 percent stays with California food merchants).[7] In addition, the huge surplus which California exports each year faces increasingly stiff competition as long distance transportation costs increase. (Truck rates have increased more than 99 percent in the last 15 years.[8]) In addition, other regions of the country are becoming increasingly wary of their dependence on a supply of food that could be disrupted, as the recent independent truckers strike helped make clear.

An overwhelming array of evidence leads to the conclusion that California's present method of producing and distributing food -- the present path from field to table -- is, in the long term, unsustainable. It needs to be altered if California is to maintain the prodigious flow of food from farm to consumer. The drain on water, soil, mineral and energy resources, the dependence on synthetic fertilizers, pesticides, a small genetic seed base, large government subsidies, and the concentration of ownership and control at all levels of California's food system, are fostering conditions which threaten the long-term viability of the entire food system. For example:

* California imports over 40 percent of the food consumed by its residents. 6,854 truckloads of food enter the state each week to supply this food. The transportation cost is $439 million each year.

* California consumers spend about $21 billion for food each year, with $8.8 billion being spent on food brought in from out of state.

* The total transportation bill for all food consumed is $1 billion.

* In the years from 1954 to 1980, California lost 43,000 farms - 35 percent of their total. In 1980, there were only 80,000 farms remaining.

* Farms having sales of $100,000 or more made up only 16.6 percent of all farms, but accounted for 88.9 percent of agricultural sales.

* Six percent of farms control 53.2 percent of the state's cropland.

* One inch of California topsoil is lost roughly every 25 years.

* Each year enough soil is lost to cover the whole length of Interstate Route 5 in California with 32 inches of dirt.

* Every year 55,000 acres of prime farmland -- an area over twice the size of the city of San Francisco -- are converted from agricultural to other uses.

* Nearly 81 percent of California cropland is irrigated, but future water supplies cannot be guaranteed to sustain this level of usage.

* Groundwater reserves in the Central Valley, being pumped for irrigation, are falling at an average of 1.5 feet per year.

* Crop yields in the San Joaquin Valley have been reduced by 10 percent due to the build-up of toxic salts from irrigation problems. These yield losses are valued at $31.2 million annually.

* Soil compaction in California costs approximately $20 million per year in alfalfa yield losses alone.

* California exported 3.4 million metric tons of grain worth $414 million to other countries in 1979 while at the same time 6.8 million tons were imported at a cost of $785 million.

* By 1985, 47 percent of California's competitive crops may no longer be economically transported to distant markets.

* Pesticide use is high -- 113 million pounds of active ingredients were applied in 1981, over 11 pounds/acre. This is considerably higher than the national average rate of 2.3 pounds per acre.

* Pesticides spread on California's cropland amount to 4.7 pounds of active ingredient for each Californian.

California's food sytem affects everyone, Californians, North Americans, and world citizens. This study draws a picture of California's food system and highlights critical areas in that picture. Farmers, consumers, industry and policy makers at the local and state level should be able to use it as a source of information, as a conceptual framework for understanding the state's food system, and as an outline for further work and action.

FOOD IMPORTS/EXPORTS

Considering that California is the leading agricultural state in the United States, it is incredible that over 40 percent of its food comes from other states and countries. Aside from exotic foods such as bananas, pineapples, coffee, and tea, which cannot be commercially grown in California, the major food items brought into the state in 1979 were meats; 97 percent of the pork, 64 percent of the chicken, 52 percent of the beef, 68 percent of the veal, and 30 percent of seafood were imported. There are however, some other more surprising revelations -- 35 percent of the state's sweetcorn was imported as was 15 percent of the fresh snap beans,19 percent of cucumbers, 11 percent of the cabbage and 29 percent of potatoes.[9] These figures are conservative because they assume 100 percent of any particular commodity grown in California stays in California to feed California residents. They do not take into account that some commodities are exported and then imported from somewhere else to feed California residents. Forty-one percent of the 1980 fruit and vegetable unloads in San Francisco and 39 percent in Los Angeles were from out of state.[10] Fresh market tomatoes, cherry tomatoes, green onions, bell peppers and bananas accounted for 62 percent of the imports from Mexico.[11]

Exporting food though is California's specialty. In 1979, 3.4 million metric tons of grain (corn, sorghum, soybeans, wheat) were exported to other countries. The value of this grain exceeded $414 million.[12] While California produced over 4 million tons of its own, 6.8 million tons were brought in from other states to support the cattle, poultry and export industries at a cost of $785 million.[13] California produces relatively little corn, but utilizes large amounts in the cattle, poultry and export industries.

Over 4 million tons of corn alone were shipped into the state (at a cost of over $475 million), an amount nearly equal to all the grain produced in California. The state harvested enough wheat to meet the requirements of the feed and flour industry, but imported 832 thousand short tons to supplement the export trade. This cost the state $108 million.[14]

The value of California's agricultural exports to other countries reached $4 billion in 1980, an increase of 43 percent over 1979. Thirty-six percent of California's harvested cropland, or 3.2 million acres were used to grow food for export. At the farm value, 23 percent of total farm marketings are sold abroad. Without the international market, "California's ranchers and growers would find it difficult to sell all they produce on the domestic market."[15] While this is true for vegetables and fruits, and some other commodities, the state is clearly deficient in grain, livestock feeds and livestock production. They are importing goods from the Midwest and in many cases are then exporting them to East Asia. Surplus commodities produced in California are exported both east (to other states) and west (abroad). The state's growers produce two times more fresh vegetables than consumed in the state, five times more fresh fruits, ten times more rice, and thirty times more almonds and walnuts.[16] (See chart 2).

In 1979, Californians spent a total of $21 billion for food, over $1 billion of which paid the costs of transporting this food into California. This is more than any other state spends. Consumers spent approximately $8.8 billion for food shipped in from outside the state. This requires an estimated 6,854 truckloads of food rolling into California each week. The equivalent of 19,417 truckloads of food leave the state each week.[17] In July of 1982, the cost to ship one truckload of vegetables from the Salinas

Table #2 ESTIMATED VALUE OF CALIFORNIA'S LEADING AGRICULTURAL EXPORTS, VALUED AT PORT OF EXPORTATION CALENDAR YEAR 1980 AND PERCENTAGE CHANGE IN VALUE 1979-1980

Rank	Commodity	Value ($ 000)	Value Change 1979-1980 Percent
1	Cotton Lint	1,135,559	+ 41
2	Almonds	429,817	+ 50
3	Rice	318,808	+117
4	Wheat	283,145	+ 72
5	Grapes (including fresh, raisins, and crushed)	230,864	+ 31
6	Oranges (including fresh, juice, and oil)	177,094	+ 67
7	Lemons (including fresh, juice, and oil)	93,210	- 4
8	Cattle and Calves (including beef, veal, hides, skins, and tallow)	91,762	- 16
9	Walnuts	82,957	+ 51
10	Peaches (including canned and portion of canned mixtures)	75,372	+ 21
11	Prunes	64,861	+ 18
12	Cottonseed (including cottonseed oil)	50,633	+ 32
13	Chickens and Eggs	43,801	+182
14	Tomatoes (including fresh and processed)	43,782	- 13
15	Dairy Cattle and Products	42,277	+ 37
16	Alfalfa (including cubes, meal, and seed)	42,276	+ 27
17	Dry Beans	42,093	+ 69
18	Lettuce	29,740	+ 9
19	Onions	28,497	+ 36
20	Pears (including canned and portion of canned mixtures)	18,477	+ 19
21	Grapefruit (including fresh and processed)	17,821	+ 84
22	Strawberries (including fresh and frozen)	16,374	+ 35
23	Dates	13,444	+ 65
24	Plums	13,278	+ 43
25	Flowers and Plants	13,052	- 8
Remaining Estimated Commodities		71,816	
All Other Commodities		527,013	
TOTAL		3,997,823	+ 43

Source: California Crop and Livestock Reporting Service, Exports of Agricultural Commodities Produced in California, 1980, p. 4.

Valley-Watsonville area of California to New York was $3,100 to $4,200.[18] In the event of any difficulties in the transportation network -- a fuel shortage, truckers strike -- California residents would not starve, but they would have to adopt a radically different diet.

In view of rising energy, water, and mineral costs, other areas of the country may become competitive producers of many commodities now grown exclusively in California. A study by the U.S. Department of Energy concluded that an energy shortage or reduction of just 10 percent would lead to a 55 percent increase in the price of raw commodities.[19] There are several crop and livestock commodities from Table 1 which could easily be produced in other areas of the country, areas much closer to the large, concentrated markets of the East. It makes sense for California to produce and export crops which grow best there, but it also makes sense for the state to begin producing more livestock and poultry to meet its own consumption needs. This would not detract from the state's agricultural industry or general economy since every dollar of output from the livestock sector of farming generates $2.78 of total product throughout the economy on its way to final consumption. Every dollar of output from the crop sector generates only $1.81 of total product.[20] From this perspective it is clear that it would be to California's economic advantage to produce more livestock for local, in-state consumption. As an added benefit, the additional animals would produce manure thereby cutting expensive fertilizer costs.

A recent study done within the California Department of Food and Agriculture determined the impact of rising transportation costs due to increased fuel costs on the state's fresh fruit and vegetable production.

The model indicates that 47 percent of California's competitive crops, those fruits and vegetables which are also grown in other areas of the country, will no longer be transported to markets by 1985 when diesel fuel reaches the projected price of $1.73 per gallon (1982 $). This was before the recent vehicle operating taxes. The costs of operating a truck are now such that this condition could happen sooner. A reduction in quantities shipped will occur prior to 1985. Rising energy prices will have little or no effect on the demand for monoply crops however -- those crops which California produces exclusively, or crops in which California has a seasonal advantage.[21]

Economics are having a big impact on the California growers and shippers. The market for California tomatoes in the summer of 1982 was at rock bottom. California tomatoes were just not moving. Many shippers who have been around for years had never seen such a prolonged period of poor prices. The packers were waiting for rain or cold weather to knock out local production in the East, while some California growers were junking their fields.[22] Lettuce prices also hinge upon East Coast demand. Some days shippers do not break even especially when lettuce is ready to be cut, but is scheduled to arrive in the East 5 to 7 days later on a Saturday or Sunday when few customers want it.[23] While the Salinas Valley is ideal for growing iceberg lettuce, other regions of the country are capable of growing much more lettuce and other greens for a longer portion of the year.

Livestock/Poultry

A seriously weak link in California's food production chain exists in the area of livestock and poultry. These commodities account for the bulk of food (77 percent) brought into the state in 1979.[24] As Table 3 indicates, California imported 1,333,000 head of cattle in 1980, most to be fattened for slaughter using imported feed grains. There was a significant increase (11 percent) in broiler and fryer production in the following year,[25] but as Table 2 illustrates, much of this extra production was exported. Agriculture officials believe the opening of new markets abroad for chicken and eggs in particular, stabilized the market and prevented a domestic supply disruption.[26] It is ironic that the increased production was not able to help meet local demand.

In 1978, the Department of Water Resources investigated the future of the livestock and poultry industries in California to see what influence this would have on the demand for the feed and forage crops grown to support these industries. While the economics and transportation costs of that time seemed to favor the importation of meat from the Midwest, the state does have numerous advantages which will favor increased meat and poultry production within the state. California's weather will contribute to lower production costs in buildings and heating. The state also has byproducts unavailable in other states which can be utilized as feed. There is an enormous amount of rangeland for grazing and high quality labor available to California producers. Local producers and distributors could better meet the needs of customers and could handle fresh deliveries which distributors in Minnesota or Arkansas, for example, could not do.[27]

LAND USE/SOIL ABUSE

Soil is the basic growing medium, the site of chemical and biological interactions which support and sustain agricultural productivity. California

Table #3

-- CATTLE AND CALVES: Number shipped into California, by state of origin, 1979-80

State	All purposes		Stockers and feeders		Immediate Slaughter	
	1979	1980	1979	1980	1979	1980
	- - - - - - - - - - - - - - - Number of Head - - - - - - - - - - - - - - -					
Arizona	500,000	343,000	323,000	211,000	177,000	132,000
Colorado	11,000	23,000	9,000	12,000	2,000	11,000
Florida	37,000	20,000	37,000	20,000	---	---
Idaho	70,000	53,000	57,000	41,000	13,000	12,000
Louisiana	19,000	8,000	19,000	8,000	---	---
Mississippi	12,000	17,000	12,000	17,000	*	---
Montana	23,000	8,000	20,000	4,000	3,000	4,000
Nevada	130,000	124,000	88,000	78,000	42,000	46,000
New Mexico	22,000	13,000	21,000	12,000	1,000	1,000
Oklahoma	10,000	18,000	10,000	18,000	---	---
Oregon	248,000	178,000	222,000	150,000	26,000	28,000
Texas	525,000	445,000	525,000	443,000	*	2,000
Utah	52,000	35,000	40,000	15,000	12,000	20,000
Washington	19,000	13,000	13,000	8,000	6,000	5,000
Wyoming	17,000	10,000	12,000	5,000	5,000	5,000
Other	49,000	25,000	49,000	23,000	*	2,000
TOTAL	1,744,000	1,333,000	1,457,000	1,065,000	287,000	268,000

* Less than 500 head.

Source: California Crop and Livestock Reporting Service, California Livestock Statistics 1980, p. 9.

has just over 10 million acres of cropland,[28] 6.5 million acres of which is prime farmland.[29] Each year, 55,000 acres of this prime farmland are converted from agriculture to other uses.[30] This is an area over twice the size of the city of San Franciso that is lost each year to development. The total loss of all agricultural land to urbanization is estimated at 150,000 acres per year, over 2½ times the area of Redwood National Park.[31] With California's current population growth, demand for land and housing will continue to grow. In 1950, the population was 10.5 million. At the most recent count in April 1980 there were roughly 24 million Californians, at a density approaching 150 people per square mile. At this growth rate, California's population will reach over 31 million by the year 2000.[32]

Nearly 81 percent of the total cropland in California is irrigated.[33] While irrigated prime acres lost to development are offset by new acreage brought under irrigation, there is a qualitative difference between the prime land that is lost and the inferior land that is gained. The prime land uses water and resources more efficiently, is usually closer to urban population centers, and produces higher yields. Seventy-five percent of the land newly irrigated over the past five years is medium and low potential Class III and Class IV land.[34] This land requires greater quantities of fertilizer to produce its yields, and providing these marginal lands with water is both difficult and expensive. California's agricultural regions are unusually varied and some special growing areas are irreplaceable. New agricultural districts will not continue to appear forever. Some crops which grow only in limited areas "could disappear from California agriculture in a shockingly short time."[35]

In the San Francisco Bay Area, about 708,000 acres of agricultural land have gone out of production since 1949, and another 19,000 acres -- a chunk two thirds the size of San Francisco -- shuts down each year. If this trend continues, farming in the Bay Area will be eliminated within 40 years. This vanishing farmbelt is vital to both the biological and economic security and stability of the Bay Area. Farms and ranches in the nine Bay Area counties produce $750 million worth of crops, employ 60,000 people, and add an estimated $2 billion to the regional economy. The farmbelt provides Bay Area residents with fresher, less expensive food than could be provided by distant farms in irrigated deserts. It also cleans the air and provides an efficient use for treated wastewater, and creates a healthy atmosphere for recreation and community life.[36]

In addition to losing productive agricultural land to other uses, California is losing the productive capacity of its soil to desertification, compaction, and erosion. California's soils are an extremely fragile and vulnerable resource. Its climate and soil are the same as the Mediterranean region, where civilization declined in history due to severe degradation of the lands. Many observers attribute this decline to soil erosion, deforestation, overgrazing and mismanaged irrigation. The natural rate of topsoil formation in California is estimated on average to be about one inch per 2000 years.[37] In intensively farmed acres however, conditions for natural soil formation do not even exist today. Organic matter is not being added to the soil as rapidly as it would be under natural conditions. It is estimated that soil is being lost to wind and water erosion at a rate of

6 to 6.5 tons per acre statewide. This means that one inch of topsoil is lost roughly every 25 years.[38] Since topsoils vary in thickness from several feet to only a few inches, this loss may be expected to cause severe problems in many areas of California in the not-too-distant future. At the erosion rate of 6 tons of soil per acre, California's cropland loses a total of 60 million tons of soil each year. This is enough to cover the length of Interstate Route 5 in California with 32 inches of topsoil. Along with this lost soil, 250 million pounds of nitrogen and 62.5 million pounds of phosphorous are washed away each year. This is over 20 percent of the nitrogen and 37 percent of the phosphorous that farmers applied in 1979, and has an equivalent fertilizer value of $50 million.[39]

There are 1.9 million acres of California's irrigated croplands which are exhibiting signs of desertification. The increase in soil salinity due to drainage problems and the build-up of toxic salts presently reduce crop yields by 10 percent in the San Joaquin Valley. Poorly drained acres cause yield losses valued at $31.2 million per year. By the year 2000, losses are expected to reach $321 million annually (1978 dollars).[40]

Soil compaction from heavy machinery adversely affects soil productivity and is a widespread problem in California. Most California soils have less than 3 percent organic matter and are very susceptible to compaction. It seriously affects 2.4 million acres of cropland and over 500 thousand acres of pasture and rangeland. Increased soil density and decreased soil aeration due to compaction interfere with the entrance of water and air into soil pores, inhibiting the growth of healthy root systems. Soil compaction in California costs approximately $20 million per year in alfalfa yield losses alone.[41]

In California, 9.5 million acres of land have water erosion problems, of which 2 million is cropland and 6.2 million is rangeland. One study estimated the cost of losses in soil, land productivity and public facilities was $16 million annually.[42]

Wind erosion in California is considered to be less important than other soil problems, but a large area of the state is subject to wind erosion. Over 7.5 million acres of rangeland including the seasonal rangeland of the Mojave Desert are susceptible to wind erosion. Extreme winds and windstorms are not unusual in many parts of California.[43] In 1977, the windstorm near Bakersfield removed 167 tons of soil per acre from a 230-square-mile-area of overgrazed rangeland. The value of nutrients lost was estimated at $24 million. Some storms take as much as 400 tons per acre at a cost of $800 per acre in nutrients.[44] Each acre-foot of soil stores about 8,000 pounds of nitrogen and 2,000 pounds of phosphorous. These fertilizer nutrients have the equivalent fertilizer value of $1,600 per acre-foot.[45] Water storage capacity is lost in eroded and compacted soils as well, adding to the loss of soil productivity.

WATER

As a resource and as an issue, water assumes almost religious proportions in California. Due to the harnessing and application of water, California's semi-desert Central Valley has been converted into North America's most varied and productive agricultural region. "Water is the life blood of agriculture, California's largest industry. Assuming that approximately 1,600 pounds of food are produced to supply the 1,500 pounds consumed annually by a typical person, and that an average of 1,000 gallons of water are needed to produce each pound of food, then it takes about five acre-feet of water to produce the food the average American consumes each year."[46] One acre-foot of water is approximately the amount of water used by an average family of five in one year, including lawn and garden irrigation.[47] California uses over 18 trillion acre-feet of water to produce the 30 billion tons of food it produces yearly.[48] By the year 2000, food production is projected to increase about 30 percent.[49] The importance of water in insuring adequate food cannot be overemphasized.

Unfortunately, water is far from abundant in California and it may prove to be the limiting factor in current agricultural production. Most of the agricultural regions in California depend upon irrigation water transported from other parts of the state or from the Colorado River. The production of one pound of the following food and fiber products under irrigation in California requires: 168 gallons for corn, 914 gallons for sugar, 565 gallons for rice, and 2044 gallons for cotton.[50]

California is facing severe, chronic shortages of water. It has been estimated that there is right now a shortage of 3 million acre-feet in California.[51] That's enough water to supply 15 million people with all their water needs for a full year. Beginning in 1985, the Metropolitan Water District in southern California will gradually lose 1.2 million acre-feet of the water it now gets from the Colorado River each year, as Arizona stakes its legal claim to this water.[52]

A shortage of water costs hundreds of millions of dollars in agricultural losses. It is estimated that the drought of 1976 cost 1.3 billion dollars in crop losses and emergency expenses.[53] In Marin County, livestock ranchers were especially hard hit by the drought. More than 41 million gallons of water had to be hauled to ranchers at a cost of $65,000 during the drought, and $953,000 was spent to pay for feed and fodder shortages.[54] There are other costs not directly related to agriculture which have to be considered: the need to import more oil due to lack of water to generate hyro-electric power, the extension of the fire season, and the restriction of camping and timber harvesting.

Depletion of surface water supplies and increasing demand for irrigation water have led many agricultural users to turn to groundwater supplies. These, because they are being pumped at rates quicker than their recharge, are being depleted at alarming rates. In the Central Valley, groundwater supplies are falling at an average of 1.5 feet per year. In the 1976 drought, groundwater reserves fell 7.5 feet.[55] Groundwater mining, which is what is occurring in the Central Valley, either exhausts the supply of water, or lowers the water table so far that the cost of pumping water eventually makes irrigation economically impractical.[56] Groundwater mining can also cause subsidence, the settling of the land as water is pumped from the ground. In the San Joaquin Valley, the land has already settled 29.5 feet. Once it occurs, subsidence is irreversible and may result in sufficient stress to cause faulting.[57] Also, as the soil settles, it becomes compacted, irreversibly losing its water storage capacity. This is exactly what happened in the Tigres-Euphrates Valley of Mesopotamia.[58]

Irrigation causes other serious problems. Over 2 million acres of

California crop, pasture and range land are affected by salt build-up.[59] When irrigation water evaporates it leaves behind salts and other minerals in the soil which reduce crop yields. A major study by the Interagency Drainage Program in 1979 concluded that, "high, brackish water tables now underlying about 400,000 acres of irrigated farmland in the San Joaquin Valley pose an increasingly serious threat to productivity. Ultimately, more than a million acres will be similarly affected."[60] The San Joaquin Valley is like a big basin covered with a thin layer of productive soils. The bottom of the basin is dense, non-porous clay which has been holding all the salty run-off irrigation water which has percolated through the thin agricultural crust. If this water continues to build up, which it will unless somehow removed, it will eventually waterlog the whole valley with salty water, destroying its agricultural potential.

The problems of water depletion, soil salinization, and waterlogging promise to be expensive and complicated to remedy. To drain the San Joaquin Valley would require over $1 billion worth of drains, pumps and holding ponds,[61] and neither of these figures include environmental costs and losses to the fishing and tourism industries.

Despite the scarcity of water and the projected expense of procuring new sources, water is still unbelieveably inexpensive and regularly wasted. For example:

- A 1976 U.S. General Accounting Office study found that more than 50 percent of all irrigation water is wasted.[62]
- About one-quater of the 1.2 million acre-feet of water in the Coachella Canal is lost to evaporation and seepage.[63]

- A 1978 Rand study estimated that California is losing between $60 and $370 million annually from inefficient use of water.[64]
- Los Angeles cleans up only 60,000 acre-feet of its 550,000 acre-feet of reuseable wastewater.[65]

Water is being squandered so readily partly because water users, particularly agricultural users, who account for 87 percent of California's water use,[66] are paying outrageously low prices. They are, in effect, being subsidized by the California and U.S. taxpayers. In some cases, the replacement cost of water is 50 times more than what farmers are paying. In the Central Valley, for example, farmers pay as little as $3.50 an acre-foot for their irrigation water. If priced to cover construction, operating and maintenance costs, water from new federal projects would cost at least $160 per acre-foot -- over 45 times the $3.50 currently being paid.[67] The Department of Interior says the federal subsidy to agriculture is worth about $1,500 per acre per year in the Westlands water district, or $3.4 million for a typical 2,200 acre farm. In the Central Valley the subsidy is worth about $1,100 per acre per year, or $2.7 billion for the entire area.[68] This "socialism for the rich " is, in the long term, debilitating to California's entire economy and the agricultural economy in particular.

As Table 4 indicates, the crop which covers the most irrigated acreage and which uses the most irrigation water is alfalfa, a feed crop for livestock. Grain, hay and pasture used exclusively for animal feed, accounted for 42 percent of the state's water demand in 1975.[69] Rice uses tremendous amounts of subsidized water yet most rice grown in the state is exported to Asia.[70]

Table #4

Comparative Values in Agricultural Production

CROP	IRRIGATED ACREAGE (Acres)	Percent	APPLIED WATER (acre-feet)	Percent	TOTAL VALUE TO PRODUCER (Dollars)	Percent
Alfalfa (hay and grain)	1,341,175	47	6,732,100	54	251,580,000	27
Cotton (lint and seed)	961,700	34	3,874,700	31	305,937,000	33
Grapes (all types)	544,805	19	1,903,350	15	368,106,000	40
	2,847,680	100	12,510,150	100	925,623,000	100

Alfalfa, cotton, and grapes were the top three crops in California in 1972 in terms of irrigated acreage, water consumed, and total value yielded to the producer. Together, these three crops accounted for nearly one-third of the irrigated acreage and applied irrigation water used by the 200 commercial crops California produces. As the table illustrates, however, the crops which occupy the greatest acreage and consume the largest volumes of water are not necessarily those which yield the highest value to the producer.

Source: California Department of Water Resources, The California Water Atlas, (Los Altos: William Kaufmann, Inc., 1978), p. 1.

This does not seem to be the most efficient way to utilize scarce water resources, nor does it seem the best way to use prime agricultural land. Crop selection, land quality, and irrigation and farming techniques all affect the efficiency of water use. Raising livestock on crops produced from irrigated land or on imported grain is a very inefficient use of limited water resources. Producing grass-fed livestock is more efficient. To produce 1 pound of grain-fed meat requires 500 to 1000 gallons of water, including the water input for irrigated grain.[71] Also, crops grown under arid conditions use 20 to 40 percent more water than they do when grown under normal conditions.[72]

Water project development is critically important to large landowners and farm operators. The large-scale farms which produce over 88 percent of the market value of the state's agricultural products have economic and political power to influence public policy. Currently, eight landholders in Kern and Kings Counties receive 40 percent of the State Water Project water from the Metropolitan Water District. These include Chevron U.S.A., Inc. (37,793)acres, Tejon Ranch Company (35,897 acres), Getty Oil Company (35,384 acres), Shell Oil Company (31,995 acres), McCarthy Joint Venture A (25,105 acres), Blackwell Land Company (24,663 acres), Tenneco West, Inc. (20,180 acres), and Southern Pacific Land Company (16,528 acres). These eight landholders control 74 percent of the vineyards, 71 percent of the orchards, 54 percent of the row crops, 72 percent of the grazing crops and 54 percent of the undeveloped land in the area receiving surplus water from Metropolitan Water District.[73] The charges to these growers for surplus water is as little as one seventh of the retail price paid by southern California customers.[74] Others estimate that agriculture pays $3 to $5 an acre for water while southern California residents pay $150 to $200 per acre.[75]

The Federal Reclamation Act of 1902, which is the forebearer of most of the federal water projects in California, explicitly limits the amounts of subsidized water any individual landholder can receive. Through failure of enforcement and through complex leasing arrangements, the 160-acre limitation, as it is called, exists only in name as single operators continue to hold thousands of federally-irrigated acres.[76] Recently, Congress voted to amend the 1902 Reclamation Act. The new bill substantially raises acreage limitations and removes residency requirements. While it does require large landholders to pay the "full" price for water, the formula which determines "full" price is believed by family farm advocates to be inadequate. This reform of an 80-year-old law designed to help small family farmers has cleared the way for large landholders to consolidate and increase their holdings.[77]

There is no acreage limitation attached to the use of water from the State Water Project (SWP) either, and small-scale farmers have been affected by the project's price structure. SWP water prices, quite a lot higher than federally subsidized water, require production of high-value crops to generate sufficient return. The substantial investment required for orchard and vineyard development is beyond the capital resources of most small-scale farmers.[78] An acre of land planted to English walnuts in the San Joaquin Valley had a market value of $8,780 in April 1982, while an acre of navel orange groves was worth $7,260.[79] Growers must possess substantial resources to obtain loans from banks and lending institutions.

Conflicts for water will increase as the competing demands for energy, industry and food production rise. Agriculture currently consumes 83 percent of the water withdrawn in the United States and an increase of 17 percent is projected by the year 2000. A major synthetic fuels program could increase water consumption for energy production four to thirty-fold over present levels. The major portion of this growth would occur in western states, and industrial uses of water will most likely be more profitable than agricultural uses.[80]

FARM SIZE, NUMBERS, OWNERSHIP

California is losing its farmers as land is becoming owned and operated by fewer and fewer large firms. In 1980, California had 80,000 farms, compared with over 123,000 in 1954. In just 26 years, the state lost 35 percent of its farms. Average farm size in this period however increased 38 percent, from 307 to 424 acres.[81] This indicates a trend toward fewer, larger farms with increasing concentration of power over the food system in the hands of fewer individuals or agribusiness corporations. According to the 1978 Census of Agriculture, 6 percent of farms conduct operations on 53.2 percent of the state's cropland. The largest 211 farm operators have average holdings of 11,500 acres of cropland each.[82] Farms having sales of $100,000 or more made up only 16.6 percent of all farms in 1978, but accounted for 88.9 percent of the total market value of agricultural products sold.[83] This concentration of land and market share in the hands of large-scale operations puts other farmers, both small and medium-sized, at a disadvantage in a system oriented toward serving large producers.

Large landowners and agricultural operators have significant competitive advantages over smaller operators. In addition to direct and indirect government support through irrigation water subsidies, marketing orders, landgrant colleges, etc., large operators can buy supplies in bulk at discount rates; they are granted lower interest rates; and they can depend on receiving credit and on selling their products. Commercial banks, producers' credit associations, and insurance companies all favor large, high-equity farmers who grow established commodities and can generate sufficient income to pay high interest rates. Smaller farmers must often resort to off-farm sources to supplement their income. In 1978, 59 percent of California farmers reported receiving outside income. Only 49 percent of farm operators listed farming as their principal occupation.[84]

While "bigness" in terms of sales, land holdings, equity, subsidies, etc. is definitely a problem in California, small farms actually outnumber the large farmers. It's just that most of the money goes to large farms. Corporations make up only 5 percent of California's farms; 81 percent are owned by individuals or families. Seventy-four percent of California farmers work less than 180 acres and 60 percent of the total farm less than 50 acres.[85] These small farms contribute significantly to agriculture in the state, producing 72 percent of the agricultural products sold in California. Defined as having less than $40,000 annual income from sales of agricultural products or having 1 to 49 acres of harvested cropland, small farms account for 58 percent of all farms in California. In San Diego County, 94 percent of harvested cropland is on farms having 1 to 49 acres. Ninety-seven percent of the value of agricultural products sold in Trinity County and 33 percent in the Imperial Valley is produced by small farms.[86]

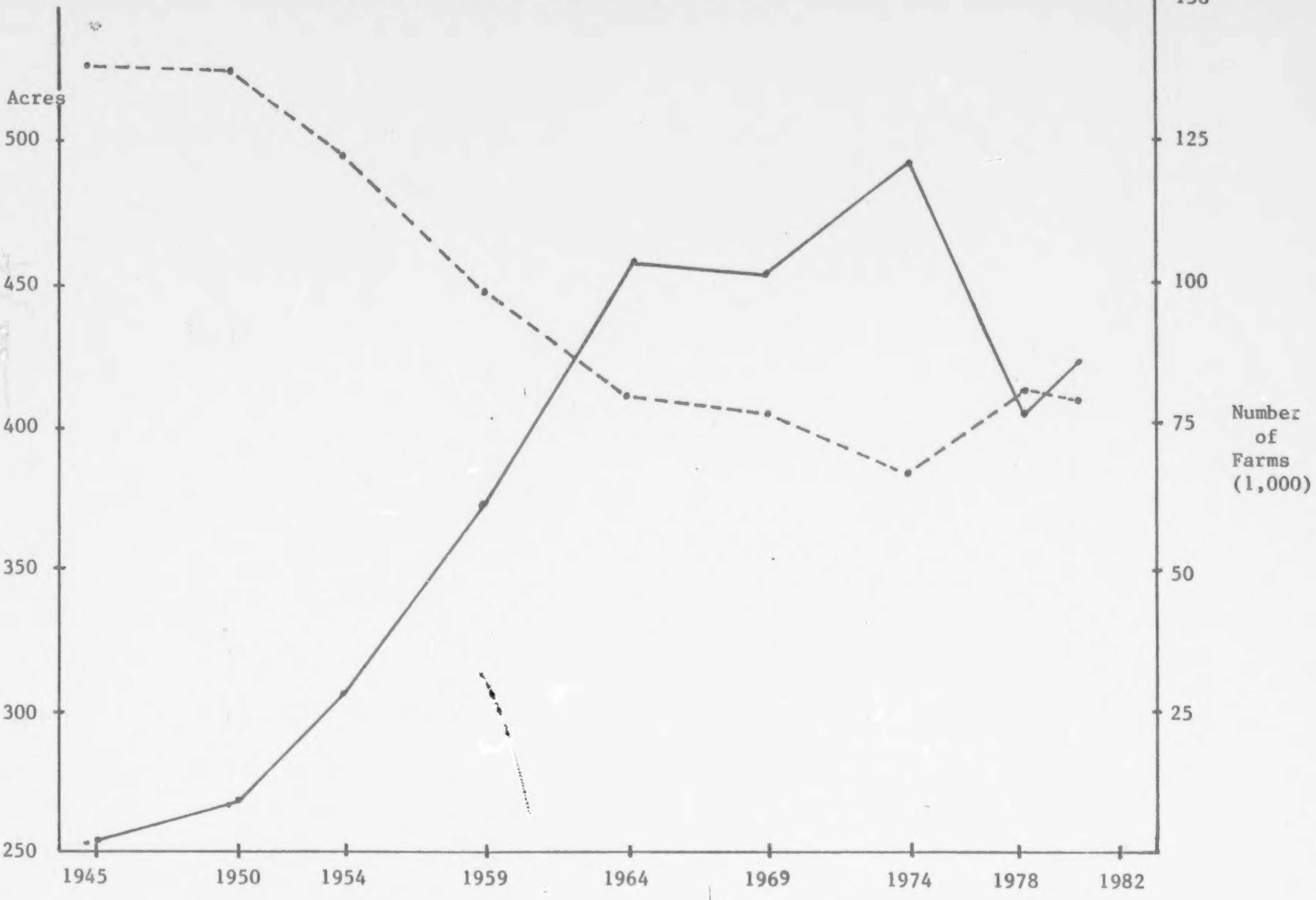
The first study relating farm size to community vitality was made in California in 1946. The study concluded that the community supporting smaller scale farm enterprises was healthier in terms of social, cultural and economic conditions. A 1977 follow-up of this work found that the results were still valid. The town characterized by smaller farms and greater proportion of owner-operated farms had a less divided class structure and higher median family income. The community services were superior, the retail economy was more sound, and the growth rate had been faster and steadier than the community supporting large-scale agriculture.[87]

While several studies on economies of size have been conducted in California, most were done in the 1960's under quite different conditions than exist in the 80's. Most studies showed that for a specific farm type, - average production costs declined rapidly at first but leveled off at medium-sized farming units. Further increases in size did increase income, but did not decrease per unit costs. Costs per dollar of sales decrease and level off at or well below the 320 acre size for nearly all California crops (fruit and nut farms, vegetable farms, cotton, cash grain, sugar beets, hay and other field crop farms).[88] A recent USDA report also concludes that farms reach efficiency at small or modest sizes and that "many commercial farms now exceed the size necessary to achieve all available cost efficiencies."[89] In light of these studies, smaller, family operated farms, of a size large enough to obtain essential economies of scale, provide a wider range of benefits to a greater number of people.

Large California farms may be even more vulnerable than their national counterparts as energy and other input costs rise. Energy costs per acre

Table #5

California Farm Size and Number 1945-30



Source: U.S. Department of Commerce, Bureau of the Census, 1978 Census of Agriculture, 1, Part 5, California, (Washington, D.C.: Government Printing Office, June 1981), p. 1.

for large California farmers ($100,000 of sales and over) are substantially more than for comparably sized U.S. farms. However, per acre energy costs for intermediate and small sales classes are lower than the national average. This same pattern holds true for fertilizer purchases.[90]

Farming is not just a business for farm families; it is a highly cherished way of life. A report of the Small Farm Viability Project (1976-77, University of California at Davis) presented survey results from a questionaire administered to 74 small farm operators. Only 40 percent of the respondents said they received adequate return on labor and capital resources while 89 percent said farming provided a satisfactory quality of life.[91]

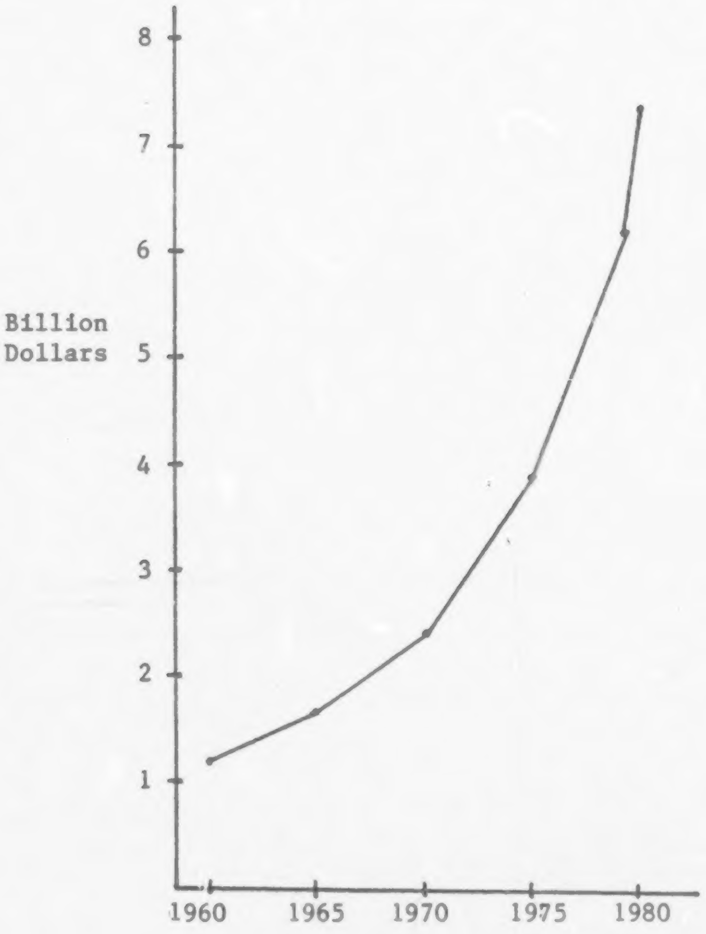
ECONOMICS OF FARMING

California farmers lead the nation in many things, including debt. Total farm debt in the state increased 78 percent in the four years from 1977 to 1981, rising from $8.032 billion to $14.32 billion. Farm real estate debt climbed 70.1 percent in the same period and in 1980, California farmers paid $634 million just for interest on their farm mortgages. Total interest payments in 1980 came to nearly $1.3 billion, over $16,000 per farm.[92] These rising costs coupled with stagnating farm prices and high interest rates have created a vicious cycle for farmers.

The increasing capital-intensiveness of farming makes it especially difficult for aspiring entrants to become established as farmers. In California about 2 out of every 3 farms sold are purchased by farmers who are expanding their current operations.[93] Most young families or workers do not have the equity to compete successfully for the financing needed to capitalize a new farm. In 1982, one acre of California irrigated land for

Table #6

California Farm Real Estate Debt 1960-80



Source: U.S. Department of Agriculture, Agricultural Statistics 1980 (Washington, D.C.: Government Printing Office, 1981), p. 477.

truck and vegetable crops was worth $3,650 in the Sacramento Valley, $4,570 in the San Joaquin Valley, and $6,600 in the Southern region. These values reflect rises of 283 percent and 313 percent since 1974 in the Sacramento and San Joaquin Valleys.[94]

None of California's farmers are exempt from financial pressures of mounting debt, high interest rates, increasing costs and sluggish product prices, and many are in serious trouble. Various management techniques are being used by the numerous small farmers to weather the current economic crisis. There is a higher incidence of off-farm employment to generate capital and to provide a cushion for hard times. In 1978, 40 percent of all farm operators worked 200 or more days a year off the farm.[95] Many small farms are financing costs from cash flow and savings rather than borrowing. Other small farms depend exclusively on family labor to minimize labor costs. While extension advisors expected few bankruptcies in 1982 - and expect very few small growers to leave farming, the belt-tightening and cost-cutting cannot continue for long.[96]

Total current farm operating expenses in California rose 9.4 percent in one year from 1979 to 1980 and have risen 41 percent since 1977. Hired labor is the largest variable cost for California growers and ranchers, making up 27.5 percent of total operating expenses for 1980.[97]

Overproduction is a major factor contributing to the low prices paid to farmers. Surpluses and an enormous abundance of grains and dairy products have caused prices to drop to record lows. Despite this, there is continued expansion of irrigated cropland in California. From 1974 to 1978, there was an increase of nearly 855,000 acres of irrigated land.[98]

This amount of land is nearly enough to double California's vegetable production. (In 1980, the state's 12.4 million tons of vegetables were grown on 875,856 acres.)[99]

FERTILIZERS

California farmers applied over 2.45 million tons of fertilizers (840,000 tons of primary nutrients) to agricultural land in 1979, which cost them $361.1 million.[100] From 1977 to 1980, fertilizer and lime expenses rose nearly 52 percent, and accounted for 44 percent of total 1980 farm production expenses.[101] Spread over 10 million acres of cropland, farmers spent an average of $50 per acre for fertilizers.

Increased fertilizer application can lead to increased production, but many farmers routinely apply far more fertilizer than the soil needs or the crops can use. In a 1981 survey of soil testing labs, many labs gave widely conflicting results even though they were all given the same Pennsylvania soil to analyze. Some labs reported inadequate fertilizer levels and recommended large fertilizer dosages while others showed adequate levels of phosphorus, potassium, or nitrogen for the same fields, but still recommended increased fertilizer applications. Residual levels of potassium, phosphorus, and nitrogen in soils are frequently overlooked or ignored, leading to additional applications of fertilizers that increase the farmers' production costs, but give no appreciable increase in yields.[102] An Agricultural Research Service report also indicated that recommended nitrogen fertilizer rates for fertile soils may be too high. Soil test laboratories must take into account the conversion of nitrogen in soil organic matter into mineral form that occurs throughout the crop season. Slashing fertilizer rates in many cases could not only save farmers money, but could also reduce pollution of groundwater by nitrates.[103] In many cases, farmers may be increasing their production costs unnecessarily. And because fertilizers are the most energy-intensive agricultural input, over-application results in wasted energy as well as wasted money.

A high dependence on chemical fertilizers means dependence on a diminishing mineral base, resulting in increased imports of phosphate, anhydrous ammonia (for nitrogen), and potash (for potassium). U.S. supplies of phosphate are expected to dwindle rapidly after the year 2000. At that time, 90 percent of our potash is expected to be imported. Anhydrous ammonia is made from a process that uses natural gas, another limited and expensive resource.[104] Once natural gas prices are decontrolled, the Fertilizer Institute believes natural gas will be too expensive to use as a feedstock for fertilizer.[105]

PESTICIDES

Remember the medfly? California launched a veritable war on this tiny insect in 1981, flying night raids to poison the bug out of the state, setting up barricades at ports, and establishing quarantines to protect the rest of the nation and to preserve the credibility of the state's agriculture industry. Nearly $100 million was spent in California to control and eradicate the medfly which was present mainly in suburban areas and backyard fruit trees. (Commercial orchards routinely spray to eliminate any pests.) The bulk of the money was spent on spraying a molasses-like bait laced with the insecticide malathion from helicopters and fixed-wing aircraft.[106]

The medfly is now considered to be eradicated in California and while there have been no real lasting effects that have come to light yet, the situation did demonstrate the potential havoc one small insect could wreak on the state's agricultural industry. The 396 medflies found between June 1980 and July 1982 caused a Japanese embargo of California produce, attempted embargos by Texas, Florida and other states, and produce from quarantined areas to be fumigated or refrigerated before acceptance.[107]

Pesticides have enabled farmers to increase output and efficiency but their use has resulted in adverse side effects on people and the environment. In California, attempts have been made to monitor pesticide use by requiring all growers, licensed pest control operators, State, Federal and local agencies to register with the Department of Food and Agriculture. Statistics are kept on each chemical -- the commodity upon which it is used, the number of applications, quantity used and the number of acres covered. The use of toxic restricted materials requires permits and records are kept of all applications of these chemicals. The Department publishes quarterly reports and annual summaries detailing exactly what chemicals are used on various commodities. California is the only state with its own regulatory agency and its standards are tougher than those at the federal level.

In 1981, total usage reported was over 113 million pounds of active ingredient, down 6.6 percent from 1980.[108] If spread evenly over California's 10 million acres of agricultural land, this is over 11 pounds active ingredient per acre, considerably higher than the national average rate of 2.3 pounds per acre.[109] This is enough for 4.7 pounds for every Californian. Nationwide, pesticides account for 3 percent of farmers' total production expenses. They make up 3 to 15 percent of the total costs for most major field crops however, and this portion is even greater for fruits and vegetables.[110] At the 3 percent rate, pesticide costs for California would have been $303 million in 1980.[111] On a per acre basis, pesticide costs for rice in California were $19.86 in 1979, rising 16 percent in 1980 to $23.04. With 548,000 acres harvested in 1980, total pesticide costs to rice growers was an estimated $12.6 million. Pesticide costs for cotton rose 22 percent from 1979 to 1980. California's 1.5 million acres of cotton received applications of pesticides costing $53.8 million.[112]

Whether farmers can continue to spend this kind of money on pesticides is uncertain in light of projected future cost increases. Besides dollars spent by farm operators, other costs are involved. These include human pesticide poisonings and fatalities, reduction of fish and wildlife populations, livestock losses, destruction of susceptible crops and natural vegetation, honey bee losses, destruction of insects' natural enemies, pesticide resistance in target populations and secondary pest problems created by the use of pesticides.[113].

Pesticides reduce environmental quality and influence ecosystem functioning by reducing species diversity. Food chains are modified; patterns of energy flow and nutrient cycling are altered; soil, water and air quality are reduced as is the stability and resilience of ecosystems. It is estimated that as little as one percent of applied pesticides reach the target organisms. Most reach nontarget sectors of the agroecosystem and/or spread to surrounding ecosystems.[114] Crop ecosystems are particularly susceptible to pesticide stress since they often lack a variety of flora and fauna. Orchards, cotton, corn, soybean and vegetable systems are most vulnerable.[115]

U.S. crop losses without the use of pesticides have been estimated to increase from the current 33 percent to 42 percent. No serious food shortage would occur, but production of certain fruits and vegetables would be greatly reduced.[116]

FOOD INDUSTRY

Agriculture, food processing, distribution and marketing constitute California's largest and most important industry. Directly or indirectly, the food industry is responsible for one out of every 3 jobs in the state.[117] Nationwide, the USDA estimates that the food industry employs one out of four workers.[118]

In 1977 there were over 2,600 food and beverage manufacturing plants in California.[119] Of these, the fruit and vegetable canning industry makes up 55 companies and 90 canning plants. There are about 25 freezing companies, half of which account for the major portion of the industry. Others are very small companies or deal with specialty items.[120]

While California does supply the United States with 45 percent of its fresh vegetables, approximately 29 billion pounds of additional vegetables and fruits remain in the state to be canned or frozen before being exported. The canning and freezing industry alone is worth $4 to $5 billion. It employs approximately 60,000 people each year paying out about $455 million annually in wages and benefits. The industry provides indirect employment for a large number of workers in related industries such as farm labor, suppliers of equipment and materials, transportation, brokers, wholesalers and retailers. In 1980, canners paid California farmers approximately $600 million for raw products. California provides the United States with

40 percent of its canned fruit and vegetables and 30 percent of its frozen fruits and vegetables. Ninety percent of the state's production is shipped out of state to other states or countries. This is equal to 270 million cases of canned goods and 900 thousand pounds of frozen fruits and vegetables annually.[121]

The large processors can dictate to farmers what and how much they plant since contracts are signed in advance. Tomato canneries determine exactly how much sauce, juice and paste they will produce based on carry-over from the previous year. The canneries set the price they will pay and the amount they will purchase from growers. In a variety of crops, cooperative processors are being replaced by independents. Tenneco West, a large landholder and major supplier of almonds, now has its own processing operation which competes with the California Almond Growers Exchange.[122]

The California fruit processing industry has been slow to respond to changes in the market-place, and as a result, profits on canned fruit are low. In the last 10 years the number of freestone peach canners has dropped from eight to three. According to an industry spokesperson, every processing fruit in the state is having the same problem. "The day is rapidly approaching when consumers will not have a choice and will be lucky to even find a can of fruit on the supermarket shelf."[123]

The freezing and canning companies utilize fruits and vegetables grown mainly in California, but there is a sizable meat packing industry which is dependent upon imported livestock or on livestock fed and fattened with grain imported from mid-western states. The 127 meat packing/processing plants employ 5900 people and produce $1.5 billion worth of product. This is about 5 percent of the national total, and would be equivalent to about half the state's consumption.[124]

The major threat to the stability of California's food industry will come as food production and processing become more regionalized. As eastern and midwestern areas begin growing more competitive produce as suggested in the results of a recent California Department of Food and Agriculture study[125] due to higher transportation costs, food processing will also shift closer to the growing areas. The tomato processing industry may be especially vulnerable since California produced 89 percent of the country's processing tomatoes[126] -- a commodity easily grown in other areas of the United States.

FOOD AVAILABILITY

Statistically, California is the most urban of the fifty states; 94 percent of the population live in cities at considerable distance from the resources which sustain them.[127] Most of these people come in closest contact with their food as consumers in their grocery store and are unaware of the production, processing and distribution channels through which the food has traveled. Supermarkets are one of the last stopovers for food.

The market areas of Los Angeles, San Francisco and Sacramento, with a total population of 17.8 million have over 2,200 supermarkets (supermarkets are defined as having sales of over $2 million yearly), or 34.4 supermarkets per 100,000 households.[128] Considering these statistics it is surprising to learn that there is already a food crisis in California's inner cities.[129] The urban poor are forced to pay exorbitant prices for food that is of poorer quality than that found in other areas. It is estimated that residents of California's inner cities are paying 20 to 25 percent more for food. Thousands of people do not have even minimal access to adequate, competitively-priced food.[130] While the problems are much greater than a simple lack of grocery stores, it is clear that many inner city residents are at a disadvantage, both economically and nutritionally.

Many people just cannot afford food. Over 7 percent of California's population are receiving food stamps. In August 1982, this amounted to 1,683,983 people receiving stamps worth over $50 million.[131] More recent data indicated that this amount is up to $58.8 million monthly. California is second only to New York in monthly food stamp expenditures.[132]

More food could be available if waste and inefficiency were reduced. Considerable amounts of food produced by farmers are wasted or lost in the food system. And, it is not just food that is lost, but energy and resource inputs as well. For produce alone, 9 to 16 percent is lost in the transportation, wholesale and retail chain.[133] For California produce grown in 1980, this is equal to a loss of at least $479 million.[134] Incredible amounts of food are wasted in the home as well. It has been estimated that 15 percent of a city's edible food is thrown out (at an annual cost of $11 to $13 million for a city with a population of 330,000).[135] Another study estimated that 14 percent of the food purchased by the average 2-person household is not eaten but discarded.[136] With cutbacks in food assistance programs, a more concerted effort must be made to minimize food waste, to both keep costs down and make more food available for consumption.

FISHERIES/MARINE RESOURCES

Over 800 million pounds of fish and shellfish were landed in California in 1980, worth $323 million to fishermen. Tuna makes up the backbone of California's fishing industry, with landings of 382 million pounds valued at $218 million.[137] The tuna complex includes six major species, most being caught off Central and South America. Bottomfish, or groundfish caught within 200 miles of the coast also bring in large revenues to the state, in excess of $50 million in recent years.[138]

While these landings are significant they represent only 70 percent of California's fish consumption;[139] fish are imported both to feed the state's residents and to supply the state's fish canning and processing industry. Much of this processed fish is then in reality exported to other states and countries. Tuna is the big money maker for fish processors, and in 1979, over 133 million pounds of fresh frozen tuna were imported for processing from countries such as Japan, South Korea, the Philippines, New Zealand and others.[140] Recently there has been a glut of tuna on the market and canneries have not been accepting fresh tuna landed in California. While the canneries can switch to other fish in this situation, it is not as profitable, and many cannery employees are working reduced hours. Fishermen have had to explore other marketing channels such as selling whole frozen tuna to consumers from the docks. These conditions are stimulating exploration and expansion of direct marketing to the benefit of those who catch the fish as well as consumers. While landings of traditional fish species are at or near optimum sustainable yield, there is potential for increasing the catch of lesser known and under-utilized species, some of which are now mainly exported to other countries.[141]

Salmon landings in 1982 were 7.9 million pounds. Vessel value of these ocean-caught salmon was $19.5 million.[142] In the early 1900's, the peak years, annual catch from ocean and rivers was around 13 million pounds each year. This decreased to a low of 4 to 5 million pounds in the late 30's and early 40's. Annual landings now usually range from 5 to 7 million pounds. This decline in salmon production is due to several aspects of man's activities, from dams on major river systems to pollution, urbanization, logging and irrigation.[143]

The transfer of irrigation water through the Delta area is creating a "reverse flow" of water. Anadromous fish (salmon type) swim toward pumps and are sucked into the California Aqueduct. Both recreational and commercial fishermen have long opposed the water projects that pose such a threat to the fish populatons of the Delta and Bay. The Department of Fish and Game estimates declines of 65 percent in the adult salmon population and 70 percent in adult striped bass. Striped bass are being sucked downstream at the rate of 70 million per year.[144]

Most aquatic ecosystems in southern California are under stress from a 70 to 80 percent depletion of instream flow due to irrigation. At these levels, a suitable habitat for most aquatic life cannot be maintained. In addition, the pumping of groundwater is causing salt water intrusion into the freshwater reserves along the coast of California, disrupting fragile ecosystems.[145]

RECOMMENDATIONS: Setting Priorities

Developing a secure, regenerative, and affordable food supply is the major goal of The Cornucopia Project. To attain this goal will require a great deal of effort on many levels -- from consumer and farmer to industry and government. The Cornucopia Project has developed a set of recommendations for California that could help create a more vibrant state economy, a more secure and affordable supply of food, and an environment that is sustainable into the 21st century.

The major strategic themes running through all of the recommendations are outlined below. These four points are the most important and deserve the highest priority. They are followed by a series of more explicit recommendations aimed at the various participants in our food system. Any thoughtful response to food system problems has to be made on a variety of levels. Responses are needed from: the consumer, who is the foundation of the entire food system and who has the most power to change it; the farmer, who produces our food; the food industry, which processes and distributes our food, and which has the power to improve our food system in relatively short order; the cities, which will be hit the hardest by any food crisis; the state, which has the power to do many of the things necessary to make California's food supply secure; and the research community, which can improve the system we now have.

MAJOR STRATEGIC THEMES

I. California Should Maintain Its Physical and Human Resource Base

Land, water and farmers are the foundation of California's largest industry. It is imperative that measures be taken to ensure the preservation of agricultural land and water supplies, and to minimize soil erosion and environmental degradation. As water supplies are depleted and soil productivity and land availability decline, there is less and less potential for sustained food production for anyone. With the state's growing population, demand for food, resources and land will continually put added stress on the whole system.

Preservation of prime farmland is no longer a debatable issue. The state needs all the prime farmland it has. It can no longer afford uncontrolled, rampant development on the best lands.

Water use must be curtailed with conservation practices and greater efficiency. The installation of more efficient irrigation systems now will ensure that crops can be produced in the future. Efforts must be made to develop crops which can tolerate drier conditions.

Farmers are critical components of our food system. Efforts must continue to make their livelihood profitable, sustainable, and accessible. People who wish to farm must have the financial and technical support to do so. Farm support services must be maintained to provide essential materials and services to the farm community.

II. California Should Support and Encourage Small and Medium-Size Farms

The vitality and health of California's food system depends upon the many small and medium-size farms in the state. Keeping these farms operating and economically viable will guarantee stability by distributing money and decision-making among many people rather than among a few large corporations with interests other than sustainable food production. The maintenance of smaller enterprises also assures more flexibility and diversity in crop production leading to healthier agroecosystems.[146]

The means of supporting these farms and farmers are many and varied. One way is through promoting and encouraging local markets. This helps to assure the farmer of being able to sell a crop and provides benefits for both consumer and producer. The benefits of buying locally are numerous. They include lower transportation costs, less energy consumed in transportation, less waste due to long distance hauling, and potentially more nutritious produce since vitamin and mineral content decreases with time following harvest. Local farmers benefit as much as consumers because they have a market for their produce which will pay more than an interstate broker. U.S. Department of Agriculture studies of direct markets in Colorado showed that local farmers received 44 percent higher gross returns if they sold locally than if they marketed through wholesale channels. Consumers received an average 28 percent discount compared to supermarket prices.[147] A study in New York City showed price savings ranging from 7 to 35 percent.[148]

III. California Should Grow More Food for In-state Consumption

Since most of the food imported into California is meat -- pork, chicken, beef, veal and seafood -- the state could increase production of these animals to become more self-reliant. California may be forced to do this as cattle production begins moving eastward from the Plains to the Midwest. Rising irrigation and transportation costs are making it more practical to raise cattle in states such as Illinois where large amounts of grain are grown.[149] Producing all the meat and poultry consumed in state is not possible since that would require 11.27 million acres of California's agricultural land. Beef production alone would require over 9 million acres.[150] However, it is desirable and feasible to increase the state's current production to minimize long distance transport and provide a fresher, higher-quality product to consumers. New jobs would be created and the state's economy would be strengthened. If California could produce all the beef consumed in state, 124,400 jobs would be created. The production of 100 percent of the state's pork would provide over 154,600 additional jobs in production, processing plants, and distribution.[151]

Besides creating jobs, increased animal production would generate more fertilizer for crops. California's livestock and poultry produced 6.3 million tons (dry weight) of economically recoverable manure in 1979, containing over 125,000 tons of nitrogen, nearly 42,000 tons of phosphorus and 110,000 tons of potassium. This is impressive when you consider that farmers used 580,000, 84,000, and 56,000 tons of N, P and K respectively in the same year. If California produced all the beef, pork and chickens needed, there would be 37,137 additional tons of nitrogen available, 15,255 more tons of phosphorus and 25,000 tons of potassium. The total would be enough to supply 28 percent of the nitrogen, 68 percent of phosphorus and 240 percent of the potassium used in 1979.[152]

Increased use and better management of marginal lands could provide additional rangeland for grazing beef cattle. Presently 12 million of the 17.5 million acres of rangeland are in need of conservation treatment.[153] The meat from these animals would be less resource intensive (fewer fossil fuel inputs for grain production, less need for capital-intensive machinery and equipment) as well as being leaner than meat from grain-fed feedlot cattle. More use could be made of fruit and vegetable cannery wastes as feed for livestock and poultry.

IV. California Should Continue to Expand Consumer Education and Awareness

Informed consumers can actively participate in working towards sustainability and regeneration in the food system. Consumer demand can effectively influence the California food industry more than any regulatory or legislative action. Individuals can also have a tremendous impact on local grocery stores and their purchasing policies simply by asking for locally grown, locally-processed foods. Increased consumer awareness and action may be the single most effective force in changing the direction of California's food system.

The following set of recommendations offers more detailed analyses of what consumers, farmers, the state and local governments, the food industry, and our research community can do to regenerate California's food system.

RECOMMENDATIONS TO CONSUMERS

1. Become more active in your food system. Increase your awareness of what foods are locally produced and which are transported in from other areas of the country. Know the nutritional quality of the food you consume. Share information with friends, neighbors, and supermarket and grocery store personnel.

2. Form a local Cornucopia Project consisting of people who want to work at changing some aspect of their food system. Possible activities include establishing home and community gardens, bartering, cooperative food buying, storing and preserving, setting up food banks, and gleaning from harvested fields.[154]

3. Purchase locally-grown fruits and vegetables in season, taking advantage of their peak nutritional value and decreased cost. You can also process these foods and store them for the periods when they are unavailable to eliminate higher costs of commercially processed and packaged food.

4. Support your local farmers by purchasing food directly from growers, thereby increasing their needed financial support while enjoying fresh, nutritious foods at reasonable prices. Start food co-ops and for additional savings, contract with farmers in the region to produce some of your food.

5. Change your eating habits to improve and maintain your health by consuming less fat, salt, sugar, and cholesterol while increasing fiber and vegetable protein intake.

6. Start a home garden to produce more of your own fruits and vegetables. Community gardens provide a greater selection of produce when the harvest is shared with cooperating gardeners. They offer access to land for those (especially urban residents) who might otherwise be unable to garden.

7. Extend your growing season by building solar grow-frames and/or utilizing container gardening.

8. Organize a land trust which could purchase critical agricultural properties as they come on the market, resell them with deed restrictions to new farm owners, or transfer them to other appropriate trusts or to the city, county, or state at some future time. A land trust is a non-profit corporation which is able to own real property or interest in real property. It is one way to offer permanent protection to selective farming areas within local communities.

9. Conserve water by introducing drought-tolerant landscaping with native plants and by installing cisterns and flow-restriction devices.

RECOMMENDATIONS TO FARMERS

I. Farmland Preservation

1. Learn about the diversity of technical assistance and services available to farmers through local conservancies and land trusts, which can show the best options for the future use of land, including areas which are not essential to farm production. This kind of planning service would help farmers realize certain economic benefits while still maintaining and preserving their farm operation.

2. Reduce excessive pumping of groundwater which can deplete aquifers at a rate faster than they can be replenished. This is of particular concern in Southern California where increased population demands, industry, and agriculture compete for fragile water supplies. Reducing overpumping will also curtail subsidence and salt water intrusion.

3. Consider crops which need less water and use mulches and groundcovers.

4. Plan for necessary drainage to avoid salt build-up in soils.

5. Preserve farmland by decreasing soil erosion. Your local soil conservation district will provide you with assistance in developing or updating a soil and water conservation management program, suggesting strategies to build the soil and reduce the need for increasingly costly fertilizer inputs.

6. Reduce soil losses through combinations of structural and management practices, such as conservation tillage, cropland terraces and diversions, contour farming, the use of crop residues, winter cover crops, and hedges.

7. Take land that is severely eroding out of production.

8. Use marginal lands for grazing livestock instead of crop production.

9. Have soils tested accurately to determine the nutrient value of the soil and its fertilizer needs in order to prevent overuse of costly, energy-intensive fertilizers. Beware of inaccurate soil testing services.

II. Farm Inputs/Resources

1. Diversify production with selected combinations or rotations of

crops or an interplay of crops with livestock. This practice would reduce fertilizer and weed control costs while providing the farmer with greater market stability.

2. Diversify production regarding not only types of crops but individual strains of a single crop so as to reduce the risk of farm pests blighting the entire crop.

3. Reduce energy use by investing in more fuel-efficient machinery, looking into solar dryers, letting crops dry naturally whenever possible, adding insulation where feasible, and taking advantage of natural lighting in farm buildings. Investigate possibilities for using alternative energy sources, whether this be the conversion of manure into methane or the use of solar heat for crop drying and other on-farm energy requirements.

4. Utilize mulching and more efficient water use in establishing young orchards. This can cut water use for that purpose by 20 percent.[155]

5. Plant crops that don't need as much water.

6. Install more efficient irrigation systems such as trickle irrigation and linear-move systems. Utilize computer scheduling where available. Time the use of sprinkler systems carefully so that evaporation is minimized.

7. When dealing with different soil types in large fields, consider reducing field size for maximum ecosystem diversity. This would establish a healthier ecosystem which can vary greatly in one large field.[156]

8. Consider using management practices that will reduce the need for chemical fertilizers, pesticides, and other expensive inputs.

9. Develop on-farm fertilizer sources by growing nitrogen-fixing legumes and green manure crops.

10. Utilize marginal land in combination with more productive soils and proper management to maintain more cattle, thereby increasing beef and organic fertilizer production.

11. Avoid routine spray schedules. Apply pesticides only when needed and target spraying to delay the onset of insect resistance, reduce undesirable residues, do minimal damage to beneficial insects, and decrease costs.

12. Consider alternatives to pesticide use and/or reduction. These could be: integrated pest management involving monitoring pest

levels for proper timing of applications, no-tillage, crop rotations and interplanting, narrow rows or broadcast seeding to establish a canopy sooner than with wide row spacing, and biological control of pests to maintain the natural ecosystem.

III. Marketing/Economics

1. Organize marketing co-ops to provide restaurants, schools, and other institutions with locally-grown produce.

2. Work cooperatively with the consumer by selling directly to the public. This will ensure a higher price for the farmer's goods and fresher produce for the consumer at a lower cost.

3. Locate marketing centers strategically for the assembly, grading, packing, and distribution of the output from many small producers thereby providing large buyers with the volumes and specifications they require.

4. Consider small-scale processing on the farm such as processing sausage, cured meats, pickles, preserves, cheeses, etc. Fresh produce can be washed, sorted and packaged for sale to restaurants and markets. Dried beans, nuts, and seeds as well as honey can be sold to food stores and restaurants.

5. Investigate before planting what specific varieties of crops purchasers wish to buy by surveying bulk food purchasers in your area.

6. Sharpen marketing skills by examining price movements to forecast supply and demand. De-emphasize concentration on farm production while allowing time to think, plan, read and analyze the current market so as to obtain a better price for agricultural products.

7. Extend the availability of some produce by staggering planting and harvesting dates and by selecting varieties with varying periods of maturation.

8. Begin to work towards changing grading and marketing standards that reflect the nutritious quality of the crop rather than its uniformity and appearance.

9. Seek to reduce debt to manageable levels.

10. Encourage local newspapers, if a section is not already provided, to devote columns to farm problems and a listing of local/seasonal food availability.

RECOMMENDATIONS TO LOCAL GOVERNMENT

1. Aid and encourage local food production and distribution by instituting a department to regulate and protect agricultural land use, encourage urban and rural food production, develop urban markets for local produce, initiate educational programs, and create plans to meet normal and emergency local food needs through local production and storage.

2. Identify the long and short-term costs to a city or county before converting any prime farmland to development use.

3. Encourage building at higher densities, and filling-in of suitable sites in existing urban areas.

4. Develop and encourage local food production by:

   a. Establishing city-run gardens in low income areas, and/or providing seeds, tools, and technical assistance on gardening to those receiving food stamps and other kinds of food assistance.

   b. Providing funds to establish gardens and/or greenhouses and subsidizing gardens in schools, prisons, hospitals, and nursing homes.

   c. Establishing community farms on urban fringes to be worked by local farmers or interested city residents.

   d. Promoting contract growing whereby groups of urban families, co-ops, or the city itself arrange to purchase food directly from a local supplier.

   e. Developing loan funds for food self-reliance projects, such as greenhouses, food preservation and storage operations, and small businesses associated with urban agriculture.

   f. Establishing urban agricultural testing programs with the state Cooperative Extension Service to test crop varieties, analyze soil for nutrients and pollutants, test crops for pollutant residues, prepare demonstration sites for various types of urban agriculture and waste recycling, and offer technical assistance on farming as well as design and construction of community greenhouses, cold frames, rooftop gardens, etc.

   g. Encouraging local industries which produce low grade waste heat to make use of this energy by producing food in attached greenhouses.

   h. Utilizing waste water and treated sewage where possible.

   i. Requiring garden areas in new multiple unit housing projects.

   j. Making certain that urban street tree programs preserve solar access for food production.

5. Develop and encourage local markets by:

   a. Establishing farmers' markets in the city, particularly in low-income neighborhoods, and facilitating authorizations for farmers to accept food stamps at the markets.

   b. Creating mobile farmers' markets and/or fish markets to visit housing projects, neighborhood centers, factories, and universities.

   c. Assisting in the formation of food cooperatives, co-op stores and preservation/storage centers.

6. Develop and encourage local food processing and storage by sponsoring community food preserving facilities where residents use this service free or at a low cost and/or providing incentives to grocery stores to establish food preserving facilities for their shoppers.

7. Facilitate access to food by implementing a "food hotline" to provide referrals for emergency food, food stamps, and meals for elderly.

8. Create a greater understanding of the importance of agriculture to urban areas through educational programs. Offer seminars in urban agriculture, aquaculture, container and rooftop gardening, food preservation, storage preparation, and nutrition.

9. Establish food banks in your area to store and distribute surplus food.

10. Have county institutions purchase their food supplies from local farmers.

11. Preserve the remaining farmland in the vicinity by creating agricultural open-space preserves to retain prime farmland for agricultural use.

12. Set aside areas for recycling facilities.

13. Consider applying part of the monies from the real estate transfer tax to a local purchase of development rights program

14. Investigate land use techniques like clustering, performance controls, and transfer of development rights which would give farmers greater options to develop either on the farm or in other areas within the community or region.

15. Establish an Agricultural Development Council similar to the one in Chester County, Pennsylvania. This council would focus on generating economic solutions to the problems of farmland loss in the counties. These local agricultural development councils would be comprised of people from the entire food system in the county and include farmers, processors, distributors, store managers, and farm service equipment dealers, as well as realtors and bankers. The council could develop local markets for local producers. It could survey local producers to see which ones would grow produce for local consumption and survey local stores, restaurants, and institutions to encourage them to purchase more locally grown foodstuffs. The council could also determine where local food is coming from and could promote more consumption of local foodstuffs. As suggested by Chester County, the council could become involved in "farm brokeraging" which would match new farmers with those who want to sell.

16. Develop and enforce county and city zoning ordinances to control land-use and management for proper reduction of sediment yield. This would include the need for local governments to create primary and secondary flood plain districts to provide land-use regulations to properties situated in floodways and to provide for flood plain zoning where necessary.

17. Minimize stream siltation and watershed erosion damage by more strictly enforcing local excavation, grading and road-building ordinances, as well as local subdivision and lot split ordinances.

18. Strictly enforce county regulations governing the use of insecticides and herbicides and the discarding of containers.[157]

RECOMMENDATIONS TO THE STATE

1. Promote agricultural production within California and nearby states by:

   a. Offering incentives for farmers to diversify production, utilizing technical assistance from extension agents and low-interest state-guaranteed loans to make changes necessary for diversification.

   b. Discouraging any concentration of economic control over agricultural resources and markets that diminishes the competitive position of the family farmer and impedes the entry of new farmers. Federal tax law is a powerful factor encouraging such concentration, but it is beyond the reach of the State. However, some major agricultural states have enacted laws seeking to reduce these negative effects through limiting ownership or investment in agriculture by certain entities such as foreign investors, investor syndicates, or conglomerates not having agriculture as their principal business. Other states are considering such laws. California should investigate this approach for its own posssible use.[158]

   c. Establishing demonstration experiments to test crop, animal, and fish varieties suitable to California soil and climate as well as developing low-input sustainable farming techniques.

   d. Providing tax incentives for small-scale food producers, such as not taxing the first $10,000 of income from food produced for local consumption.

   e. Issuing state tax credits for home and farm production, processing, and storing of food.

   f. Encouraging new farmers through loans and incentives to enter into certain types of farming operations, those which would maintain the optimal balance of farm types in the state. (See Research Recommendations #1).

   g. Initiating a program like New England's Small Farm Management Assistance Program to provide practical farm management skills to small-scale commercial farmers on a one-to-one basis.[159]

   h. Organizing a farmer linkage program whereby experienced farmers bring prospective farmers into their operation easing the transfer of land ownership over time. In this way the new farmer would be more successful in avoiding costly farming mistakes while gaining the tenured operator's knowledge of the farm.

   i. Establishing a statewide Agricultural Development Council which would seek to enhance the viability of farming throughout California in the same way that industrial development agencies seek to encourage industry to locate in-state. This kind of council would consist of representatives from all parts of the food industry.

2. Preserve remaining farmland in the state by:

   a. Publishing guidelines to help local governments protect agricultural land and enhance farming. These guidelines could include ways to prevent "leapfrog" or random development, which removes from production not only the land that has been developed, but which in the long run isolates adjacent farming areas and inhibits certain farming activities. The state could also delineate ways whereby municipalities could best protect farmland in urban fringe areas, and it could prepare guidelines for different kinds of farmland preservation strategies and techniques including agricultural zoning, agricultural districts, transfer of development rights, community land trusts, performance zoning, and so forth. It could prepare procedures which would help local governments assess the different kinds of strategies that would be most appropriate and feasible for them, given the extent of farming in the area, development pressures, commitment of farming community to remain in agriculture, existing and potential land use, economic characteristics, natural features, and attitudes of local residents towards preserving farmland.

   b. Using economic incentives to promote construction of affordable housing, small-scale commercial districts and clean industry within existing urban areas; use disincentives to discourage the sprawl of low-density development across agricultural land. 160

   c. Instituting a farmland capital gains tax in ways which would discourage speculators from investing in farmland, and selling it for development.

   d. Reducing the capital gains tax for those farmers who sell farmland to young, beginning farmers, especially if farmland is sold at less than full market value.

   e. Creating a committee to inventory and monitor all state-owned farmland and assess its productive capability while working to ensure that this land remains in farming.

f. Adopting a "right of first refusal" or preemption option which is currently used in France, where owners of farmland within designated areas must by law notify a state-chartered nonprofit corporation of their intention to sell their land. The corporation has the right to buy the farmland within 30 days.

g. Identify and protect unique and endangered areas, whether publicly or privately owned. The goal is to preserve genetic diversity, biological productivity, and ecological integrity as well as safeguard recreational, historic, cultural and agricultural values.[161]

h. Encouraging legislation which would record agricultural land transfers on an annual basis.

i. Keeping a yearly record of how effective current farmland preservation legislation has been.

3. Preserve water, soil and other natural resources by:

   a. Linking economic programs, such as loans, crop insurance, disaster relief, and state purchase of farm commodities, to the avoidance of excessive soil erosion and use of efficient irrigation techniques.

   b. Instituting and enforcing a "severance tax" on soil losses due to excessive erosion to finance subsidies, to encourage conservation practices, and to pay for downstream dredging of silt, damage to water treatment facilities, and other social costs.

   c. Establishing rewards for soil enrichment, such as tax credits for on-farm soil and water conservation programs, including contour tillage, minimum tillage, and crop rotation. Using public subsidies, such as low-interest loans, preferential farm property tax formulas and valuations, and other tax incentives to encourage cover and permanent cropping, minimum tillage, ridge planting, proper rotation, longer rotations, biological nitrogen fixation, contour plowing, terracing, stripcropping, leaving harvest residues on soil surfaces, reducing soil compaction and salinity, intercropping, and regional organic waste recycling.

   d. Developing incentives for encouraging the use of rental arrangements which include provisions for sharing erosion control and soil enrichment costs with the landowner.

e. Developing public awareness programs to promote understanding of the need to support sound soil conservation practices.

f. Paying more attention to economic efficiency criteria in developing and allocating water and stop using water policy to redistribute income.[162]

g. Pricing new water at the relevant marginal cost and reforming water institutions to permit them to use this rule.[163]

h. Creating firm property rights in water similar to those in land and allowing a water market to allocate it among uses and users.[164]

i. Using depletion and effluent taxes as corrective devices when external effects are significant, such as in pumping groundwater from common pool aquifers and in the most severe water quality cases.[165]

4. Expand local markets by:

   a. Establishing more farmers' markets and organizing wholesale farmers' markets to supply retailers, consumer co-ops, and other volume purchasers.

   b. Increasing promotional efforts for direct purchase of food from farmers by supermarkets, restaurants, schools, hospitals, and other institutions.

   c. Continuing to develop linkages between large-volume food buyers and California producers.

   d. Giving preference to in-state producers in bidding for the sale of foods by permitting state institutions to purchase foodstuffs directly from local farmers and in-state producers at prices at or in excess of the lowest submitted bid according to a percentage to be determined by the state. An example of this kind of policy is the state of Maine's 1979 law relating to state agency purchase of Maine's farm and fisheries products. Massachusetts is also considering such a law.

   e. Assessing the viability of implementing in California marketing alternatives to determine price and maintain market access for individual farmers through electronic commodity markets, vertical coordination through forward contracting, forward deliverable contract markets, and mandatory public reporting of market information. Other options include exclusive agency bargaining, vertical integration through ownership, joint ventures between agricultural cooperatives and agribusiness-marketing firms, marketing orders, and marketing boards.[166]

f. Establishing regional livestock marketing committees to evaluate alternatives such as regional market centers owned and operated by either a local or a regional cooperative, a regional electronic sales exchange, and contract sales to packers, while providing for more direct movement from producer to slaughterer thereby decreasing costs.[167]

g. Providing incentives for existing food companies to develop more energy-efficient processing and packaging techniques, along with incentives to attract new food processors.

h. Helping to establish community food processing and storage facilities for the use of families and small commercial food producers. In this way, economies in equipment and energy consumption can be realized.

5. Effect a transition from depletable to renewable energy sources by conducting regional inventories of all renewable energy sources and providing incentives, such as tax credits or low-interest loans for investments made in agricultural energy conservation and on-site development of renewable energy sources, or tax exemptions for income received from the production of renewable energy.

6. Recycle organic wastes to utilize their full potential by:

   a. Preparing a state-wide inventory of the types and amounts of organic wastes available now and in the future and assess the ability of these wastes to improve soil fertility and tilth and their potential energy use.

   b. Developing incentives for using local organic wastes for fertilizer and incentives to industry to separate toxic substances from their wastes so that they might be more safely used on cropland.

7. Enact a bill which requires returnable bottles and the recycling of metal cans. This would reduce materials consumption in the food system.

8. Develop long-range food system plans by:

   a. Instituting a transportation policy - in conjunction with private industry and agriculture - which governs the shipment of agricultural commodities.[168]

   b. Creating an overall state food policy which will increase regional self-reliance and economic viability.

c. Conducting an annual study of the condition of the state food system to find out the amount of food currently being imported and exported, soil erosion losses, amount of land lost to development, and other food system issues while stating what California can do to increase its self-reliance.

9. Instill a greater understanding of agriculture's role in all California citizens by:

    a. Increasing awareness of seasonal, locally-grown produce, and its nutritional and economic benefits.

    b. Initiating educational programs on farmland preservation, water conservation, farm energy conservation, reduced pesticide and fertilizer use, recycling of organic wastes, and energy expenditures in different methods of farming and home food production and preparation.

    c. Promoting nutrition education campaigns illustrating the relationships between diet and health and the benefits of fresh, locally-grown, and minimally processed foods, as well as bulk purchasing of food.

    d. Communicating goals and the condition of our food supply as revealed in the state's annual study.

10. Agricultural programs initiated or funded by the state should give high priority to serving the needs of the family farmer.[169]

11. Strengthen and expand tax policies and building codes that reward energy-efficient building, manufacturing, agricultural practices and waste disposal.[170]

12. Preserve fisheries resources by:

    a. Designating and enforcing fishing regulations to maintain the optimum sustainable yield while protecting the natural marine ecosystem.

    b. Encouraging improved fishing practices and equipment to achieve the optimum sustainable yield while protecting the natural marine ecosystem.

    c. Requiring water projects to provide funds for determining project effects on the fisheries and for making such adjustments as may be necessary. This must include adequate pre-project and post-project studies.[171]

d. Providing that water development agencies have a continuing responsibility for the maintenance and enhancement of fish and wildlife for the life of the project.[172]

RECOMMENDATIONS TO THE FOOD INDUSTRY

1. Encourage sustainable farming methods by using the food industry's influence on farm production techniques to decrease the use of large amounts of irrigation water and dangerous pesticides and increase the use of soil conservation measures. De-emphasize produce appearance while concentrating on freshness and nutritional quality.

2. Minimize energy and material use by using less processing (and/or more efficient methods), simpler packaging, and rail networks more often in transporting commodities.

3. Promote the consumption of fresh, locally-produced food in season, enhancing consumer nutrition and building a stronger local economy.

4. Provide nutrition education, hints for food preparation, and techniques on preserving fruits and vegetables.

5. Focus on food in a holistic way, recognizing that diet is an essential component of a healthy life and is influential in preventing as well as treating illness.

6. Grocery stores should purchase and label for consumers California products. Point-of-purchase literature could be made available to consumers to make them aware of where food orginates and the issues involved with this.

RECOMMENDATIONS TO THE AGRICULTURAL RESEARCH COMMUNITY[173]

1. Determine the optimal mix of farm types in California to obtain sustainable yields of both crops and livestock to meet the state's consumption needs and to provide a sufficient level of exports. Determine the production needed to support processing plants for various commodities. If the commodity is produced in quantities sufficient to make a processing plant economically competitive, this would be an incentive for establishing those businesses in state.

2. Assess relationships between biofuels development (including forest resources) and long term soil productivity to provide guidelines for future programs.

3. Investigate how to improve the capability of using forage and crop wastes, as well as wastes from food processing.

4. Improve forage and grain species through plant breeding.

5. Integrate new crop cultivars into feed production strategies that optimize and preserve natural resources yet maximize efficiency of energy use.

6. Continue and expand small-scale agriculture research at the University of California. This will not only aid small-scale enterprises, but will also help large-scale farms diversify.

    a. There is a need for smaller equipment which would use less energy and decrease the amount of soil compaction and erosion, at a cost that small operators can afford.

    b. Continue and expand research on fruits and vegetables and post-harvest handling methods to benefit small-scale producers.

    c. Continue livestock management and forage research programs aimed at smaller enterprises.

    d. Continue to develop beef feeding systems based on forages rather than high-energy grains.

7. Work to develop plants which resist pests and mature earlier so less drying is required.

8. Develop crop varieties adaptable to low-input farming systems in California.

9. Continue and expand research on dryland agriculture.

10. Conduct studies to determine the salt loading that occurs under various water application technologies. Farmers could then be taxed in such a way that the external cost of soil salinization could be internalized, thus providing an incentive for farmers to reduce the damage.[174]

11. Investigate California's soil erosion problems, looking at crop residues, run-off, tillage practices, rotation systems, terraces, equipment use, etc.

12. Investigate perennial agricultural systems (permaculture) appropriate to California to eliminate annual soil disturbance and decrease energy, fertilizer, pesticide and herbicide usage.

13. Determine the long-term effects of recommended applications of chemical fertilizers, pesticides, and herbicides on the productivity of selected California soils.

14. Update the Stanford Research Institute's inventory of organic wastes which are available to improve soil fertility and tilth.

15. Investigate methods to utilize California municipal wastes in agriculture.

16. Expand research on biological nitrogen fixation.

17. Increase exploitation of legumes that fix their own nitrogen and that have higher feed intake potential and overall forage quality than do grasses.

18. Improve crop management, harvesting and storage methods to minimize losses of plant material.

19. Explore alternative feed sources -- by-products and wastes from agriculture, domestic and industry sources -- in the interests of conservation of resources and economy. Also look into the use of aquatic plants and animals as feeds.

20. Set up plots to study the transition phase of switching from conventional to low-input farming systems.

21. Examine the response of different sizes and types of farming units to changing energy and resource scenarios.

22. Continue research on the impact farm scale has on rural communities.

23. Examine methods for producing food in cities, e.g.,rooftop food production systems. Seek ways to make urban food distribution and marketing systems more accessible to local and regional food producers.

24. Develop more energy-efficient food processing, storing, and distribution techniques.

25. Explore feasibility of switching to more energy-efficient transportation modes.

26. Explore the potential of small-scale aquaculture in California to provide high-quality protein using cost-efficient and ecologically sound methods.

27. Expand and intensify studies of relationships between fish resources and their habitats and between stream turbidity and sport fishing success.

28. Conduct studies to develop new and efficient stream rehabilitation practices.

29. Establish an adequate flow and sediment monitoring network on North Coast streams.

30. Develop alternate logging methods to reduce erosion and stream siltation. 175

31. Develop scientific information on the stocks and life histories of commercially, recreationally, and ecologically important species of fish, shellfish, marine mammals and other marine fauna.

32. Develop scientific understanding of the effects of man's activities, including navigation, agriculture, mineral extraction, recreation, and waste discharge, on the marine ecosystem.

SUMMARY OF RECOMMENDATIONS

The preceding lists of recommendations are not easy reading. Some of the recommendations may seem hard to implement. Regeneration is never an easy process. But consider how much harder it will be to pick up the pieces should California's food system collapse.

Our recommendations should be viewed as a flexible agenda rather than a rigid program. They are based on what we know today. Tomorrow, as we learn more, we can revise our assessments of the problems and our options. We hope that part of our learning process will come from you in the form of feedback on what you've read in this report.

It is vital that we all realize we have the option to change our food system, and that we can exercise that option now. The time to begin planning for regeneration is today.

WHAT HAS BEEN DONE

There are many agencies and organizations in California which are already working to create a sustainable and stable food system. In every area of concern - from water and land issues, to marketing and nutritional issues, to general structural analysis - people in California have been developing and refining understandings of and information about the state's agricultural industry. This has resulted in many positive actions carried our by both the state and private sector. Although there is much work to be done, first steps have been taken. We acknowledge and congratulate the research and development efforts directed towards the creation of a sustainable food system. The following listing highlights some of the efforts being made at a variety of levels.

* In April 1976, a Direct Marketing Program was established with the California Department of Food and Agriculture. A number of programs and trial projects were established as a result: a direct marketing hotline and newsletter, facilitation of institutional purchases of food directly from growers, certification program, annual Direct Marketing Conference, etc.[176]

* California has a statewide Direct Marketing Association to serve the interests of direct marketing and related alternative marketing strategies.[177]

* The California Department of Conservation is engaged in a Farmland Mapping and Monitoring Program which will 1) establish an inventory and data base of commercial farmlands and grazing lands in California, and 2) document, map, and report farmland conversion each year. Computers will permit rapid update and revision of farmland maps.[178]

* Many county governments, where the greatest authority to protect agricultural land lies, have instituted large-lot zoning. The minimum size may be as low as two or as high as 320 acres, so as to make the land unattractive for anything other than agriculture.[179]

* People for Open Space, a regional planning group in San Francisco is active in farmland preservation and recently completed a study on San Franciso Bay area farmland entitled, Endangered Harvest which has made

farmland preservation a larger issue in the area.[180]

* A bill calling for a state-wide Agricultural Land Trust is to be reintroduced in the 1983 California legislative session.[181]

* The University of California appointed a special task force in 1976 to bring to light the public policy issues and information needs of the 1980's. The result was the publication of Agricultural Policy Challenges for California in the 1980's, a 137-plus page document.[182]

* The University of California Cooperative Extension has a strong small farms program dedicated to farmers and other participants in "limited-scale agriculture" in California. [183]

* The California Institute for Rural Studies, funded by private donations and public grants, has a library devoted to agricultural issues and conducts research not being done by the university and other institutions. The Institute prepares books and papers, and gives seminars on agricutural topics.[184]

* The California Department of Consumer Affairs collects data on the consumers' cooperative movement through its Cooperative Development Programs. It issues a Food Co-op Directory annually and numerous other publications on cooperatives and direct marketing.

* The California Legislature has revised the Agricultural Code to encourage aquaculture, the cultivation of fish, plants and crustaceans in fresh and saltwater. Aquaculture officially became part of the state's agriculture industry in August 1982, making its farmers eligibe for state subsidies and other forms of aid.[185]

* The California Occupational Safety and Health Administration recently imposed very strict exposure standards for the fumigant ethylene dibromide (EDB), used to fumigate fresh fruits and vegetables. California's standard on exposure to EDB is far stricter than the current federal standard.[186]

* California has instituted a tax on beef shipped in from out-of-state. (At this writing, hearings were being conducted in a suit filed against the tax by the American Meat Institute, the National Meat Association, and 11 packing companies.)[187]

* The California League of Food Processors has joined forces with the State and energy utilities to research and develop cogeneration alternatives to oil and natural gas. The Sun Diamond Growers, Inc. is turning walnut shells into gas; Lindsay Olive Growers use olive pits for fuel; and the California Almond Growers Exchange generates electricity and steam from almond shells.[188]

* The California Department of Food and Agriculture has strict regulations governing pesticides. The Division of Pest Management, consisting of four units, regulates the registration, sale, and use of pesticides.

The Pesticide Registration and Agriculture Productivity unit requires registration of all insecticides, fungicides, disinfectants, rodenticides, herbicides and other materials used around homes, industry, or farms for control of pests before being offered for sale in California. The application of any restricted material requires a permit, and quantities of all non-restricted materials applied by licensed pest control operators are reported. Quarterly and annual pesticide use reports are issued by the Department of Food and Agriculture. Data includes the chemical, the commodity upon which it was used, and the number of applications, pounds and acres.

The Pesticide Enforcement unit works with county agricultural commissioners to develop and enforce regulations governing pesticide use, storage, and disposal, and aid in investigative techniques, and worker health and safety procedures.

The Worker Health and Safety unit works to protect farm workers who mix, load, apply, store or otherwise handle pesticides or who work in treated areas.

The Environmental Monitoring and Pest Management Unit assembles information and data on integrated pest management, biological control, fate and behavior of pesticides in the environment, air pollution effects, and effects of these interactions on agricultural production and the environment.[189]

* The California State Legislature has awarded a major grant to the California Institute of Public Affairs to fund the California Farmlands Project, an investigation of farmland preservation in the state by a 38-member task force.[190]

* The California Farm Bureau Federation held a special conference for its leaders on farmlands conservation in October 1982.[191]

* The League of Women Voters of California has adopted agricultural lands as a priority issue for study and action.[192]

* The Sierra Club has reactivated its California agricultural lands committee.[193]

* The State Coastal Conservancy has incorporated farmland preservation into several of its projects in the coastal zone, which has an estimated 3.5 million acres of land devoted to grazing, dairy production, and fruits and vegetables.[194]

* County and city efforts to coordinate land use and development are facilitated by Local Agency Formation Commissions (LAFCOs) which exist in all counties of the state except San Francisco. LAFCOs mediate boundary disputes among cities and between cities and counties and identify the ultimate physical boundary and service area of each local government entity.

However, the LAFCOs have little real political power and have been effective in only a few instances.[195]

* The California Land Conservation Act of 1965 (Williamson Act) gives property tax benefits to farmland owners who agree not to convert their land to nonagricultural uses. However, this program is voluntary and has not been very effective in curbing agricultural land conversion especially without stringent agricultural zoning. The value of the Act diminished greatly with the passage of Proposition 13, the Jarvis-Gann tax reduction initiative of 1978.[196]

* Cities and counties are required by state law to develop general plans to rationalize and regulate growth, in part to protect open space and agricultural land.[197]

* Under the Williamson Act, legislation was passed in 1980 which permits landowners to have their land taxed either on the capitalization of income method or comparable sales and pay the lesser amount with county agreement. (AB 581)[198]

* Legislation exists which prohibits non-resident aliens or alien business entities from purchasing, holding or acquiring an interest in agricultural land. (AB 262)[199]

* Surviving spouses have total exemption from inheritance taxes. Provisions allow up to $500,000 tax exclusion on farm property passed to or inherited by a member of the decedent's family, and provides for the imposition of an additional tax, if within 15 years after the decedent's death, the heir to such property disposes of any interest in or ceases to use the land for farming. (AB 2092)[200]

* Fifty percent of all food sold in school snack bars and vending machines must be nutritious food, comprised of milk and dairy products, fruit and vegetable juices. (AB 3406)[201]

* Any entity or organization that sells food on school premises must select at least 50 percent of the food items to be sold from a list of nutritious foods. (AB 753)[202]

* Personal and corporate income tax deductions are allowed for taxpayers who make donations of food to non-profit charitable organizations. (SB 26)[203]

* The Organic Foods Act of 1979 provides standards relating to the production, advertising and labelling of food products as being "organic", "organically grown", "naturally grown", "wild", "ecologically grown", or "biologically grown". (AB 443)[204]

* Legislation was passed to create a financial incentives program for the purpose of stimulating the development and commercialization of renewable resource energy technologies in agriculture. This program will also assess the potential for solar energy projects in agriculture. (AB 3048)[205]

* The Department of Food & Agriculture currently administers a program which offers financial assistance, in the form of low-interest loans to farmers for on-farm production of alcohol fuels.[206]

FOOTNOTES

1. The Cornucopia Project, Empty Breadbasket? (Emmaus, PA: Rodale Press, 1981), 170 p.

   Richard Harwood and J. Patrick Madden, Research Agenda for the Transition to a Regenerative Food System, 1982, 22 p.

   The Pennsylvania Food System: Planning for Regeneration, 1982, 99 p.

2. California Department of Food and Agriculture, California Agriculture - 1980, Annual Report, p. 2.

3. California Department of Food and Agriculture, The State of California Department of Food and Agriculture...and What It Does for You, p.1.

4. California Crop and Livestock Reporting Service, California Vegetable Crops, Annual Bulletin, 1979-1980, p. iv.

5. California Agriculture - 1980, p. 9.

6. California Agriculture - 1980, pp. 3, 9.

7. Rodale Press, Comp., California Food Imports chart (Emmaus, PA: Rodale Press, 1983).

   5.3% of retail value of food is cost of truck and/or rail transportation.

   Source: U.S. Department of Agriculture, 1980 Handbook of Agricultural Charts, Agricultural Handbook No. 574, (Washington, D.C.: Government Printing Office, 1980), p. 39.

8. American Trucking Association, American Trucking Trends 1979-80, p. 58.

9. California Food Imports chart.

10. U.S. Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division, Fresh Fruit and Vegetable Unloads in Western Cities, March 1981, pp. 16, 37.

11. California Department of Food and Agriculture, Division of Marketing Services, Bureau of Market News, California Fresh Fruit and Vegetable Shipments 1979, September 1980, p. 6.

12. California Department of Food and Agriculture, Division of Marketing Services, Bureau of Market News, Grain, California Market Summary 1979, May 1980, pp. 25, 28.

13. Grain, California Market Summary 1979, pp. 1, 27, 28.

14. Grain, California Market Summary 1979, p. 1.

15. Calfornia Crop and Livestock Reporting Service, Exports of Agricultural Commodities Produced in California, Calendar Year 1980, August 1981, p. 5.

16. California Food Imports chart.

17. California Food Imports chart. Estimates based on an average load of 40,000 pounds.

18. California Department of Food and Agriculture, Bureau of Market News, Fruit and Vegetable Truck Rate Report, Vol. 4, Report 30, July 29, 1982, p. 1.

19. U.S. Department of Energy, Agriculture and Food Processes Branch Program Summary Document, June 1980, (Washington, D.C.: U.S. Government Printing Office, 1980), p. 12.

20. M. C. Hallberg, "Testing for Change in Pennsylvania Agriculture: A Modeling Technique," Farm Economics of the Cooperative Extension Service of Pennsylvania State University, December 1981, p. 1.

21. Mary A. Marchant, California Department of Food and Agriculture, Long Range Planning, "The Impact of Long Distance Energy Related Transportation Costs on California Fresh Fruit and Vegetable Production," Final Draft, December 1982, p. i.

22. Tom Linden, "Home-grown takes blame for 'rock-bottom' market," The Packer, September 4, 1982.

23. Harre W. Demoro, "Getting California's Lettuce Into New Yorkers' Salads," San Francisco Chronicle, August 30, 1982, p. 44.

24. California Food Imports chart.

25. California Agriculture - 1980, p. 3.

26. Exports of Agricultural Commodities Produced in California, p. 5.

27. Mel Warner and Bob Ernst, Department of Water Resources, Statewide Planning Branch, Livestock and Poultry Feed Crop Study, Pre-Study Interviews (April-May 1978), July 1978, pp. 5 -12.

28. U.S. Department of Agriculture, Soil Conservation Service, Basic Statistics 1977 National Resources Inventory, rev. 1980. (Washington, D.C.: Soil Conservation Service, 1980), Table 3, p. 3.

29. Basic Statistics 1977 National Resources Inventory, Table 18.

30. California Department of Conservation, California Soils: An Assessment Draft Report, April 1979, p. I-20.

31. "Land: The Irreplaceable Resource," California Tomorrow, A Report of the California 2000 Project, Summer 1982, p. 24.

32. "Population: The Increasing Pressure," California Tomorrow, Summer 1982, pp. 14,16.

33. Basic Statistics 1977 National Resources Inventory, Table 3, p. 3.

34. California Soils: An Assessment, p. IV-40.

35. California Tomorrow, p. 25.

36. Endangered Harvest, The Future of Bay Area Farmland, The Report of the Farmlands Conservation Project of People for Open Space, November 1980, 80 pp.

37. California Soils: An Assessment, p. I-8.

38. California Soils: An Assessment, p. I-9.

39. 6 tons/acre x 10 million acres = 60 million tons
Calculations based on the following:

    Soil weighs 160 tons/acre-inch.
    Interstate Route 5 is 800 miles long and an average of 120 feet wide including the median strip. (personal communication, California Department of Transportation.)

    Each acre foot of soil contains 8000 pounds of nitrogen and 2000 pounds of phosphorus. from: W.E. Larson, "Protecting the Soil Resource Base," Journal of Soil and Water Conservation 36, No. 1 (1981), pp. 13-16.

    Average prices, June 1981 $266/ton N
    $ 130/ton P

    Fertilizer usage from: California Department of Food and Agriculture, Fertilizing Materials, Tonnage Report 1979.

40. California Soils: An Assessment, pp. III- 34, 52.

41. California Soils: An Assessment, pp. III-53, 57.

42. California Soils: An Assessment, pp. III - 15, 16.

43. California Soils: An Assessment, pp. III - 39, 40, 42.

44. California Soils: An Assessment, p. I-13.

45. W. E. Larson, "Protecting the Soil Resource Base," Journal of Soil and Water Conservation 36, No. 1 (1981), pp. 13-16..

    Value based on June 1981 average prices.

46. State of California, Department of Water Resources, The California Water Atlas, (Los Altos, CA: William Kaufmann, Inc., 1978), p. 1.

47. California Water Atlas, p. vi.

48. California Food Imports chart. Based on 1000 gallons water for each pound of food.

49. David Pimentel et. al., "Water Resources in Food and Energy Production," BioScience 32, No. 11 (December 1982), pp. 861 -867.

50. Pimentel et. al., p. 862.

51. Julia Vitullo-Martin, "Ending the Southwest's Water Binge," Fortune, February 23, 1981, p. 93.

52. Daniel J. Blackburn, "Double trouble for MWD: loss of water, internal attack," California Journal, March 1980, pp. 398-99.

53. Anne Jackson, "How California life will change as a result of two parched years," California Journal, April 1977, pp. 111-120.

54. California Department of Water Resources, Impact of Severe Drought in Marin County, California, Bulletin 206, November 1979, pp. 5, 30.

55. Jackson, p. 114.

56. "Water loss to make irrigation impractical," The Drovers Journal, October 8, 1981, p. 18.

57. Pimentel et. al., p. 864.

58. Timothy Pfaff, "California's Peripheral Canal," Environment 24, No. 3. (April 1982), pp. 25-35.

59. California Soils: An Assessment, p. III-45.

60. San Joaquin Valley Interagency Drainage Program, Agricultural Drainage and Salt Management in the San Joaquin Valley, Final Report, June 1979, p. 1-1.

61. California Soils: An Assessment, p. III-52.

62. General Accounting Office, "Ways to Resolve Critical Water Resources Issues Facing the Nation,"Report CED 79-87, April 27, 1979, p. 19.

63. Vitullo-Martin, p. 96.

64. Vitullo-Martin, p. 96.

65. Vitullo-Martin, p. 96.

66. California Water Atlas, p. 3.

67. Vitullo-Martin, p. 94.

68. Vitullo-Martin, p. 96.

69. Joe Fitz, Outlook for Water Consumption by California Feed and Forage Industry, Through 2010, Department of Water Resources Bulletin 212, February 1982, p. 2.

70. California Water Atlas, p. 84.

71. Pimentel et. al., p. 862.

72. Pimentel et. al., p. 863.

73. Don Villarejo, New Lands for Agriculture, California Institute for Rural Studies, August 1981, 16 pp.

74. Pfaff, p. 32.

75. Pfaff, p. 38.

76. Jackson, p. 114.

77. "Reclamation Reform," Ruralamerica 7, No. 3&4 (Fall, 1982), pp. 15-16.

78. Villarejo, p. 12.

79. U.S. Department of Agriculture, "Farm Real Estate Market Developments," Outlook & Situation, July 1982, p. 19.

80. Pimentel et. al., pp. 861, 866.

81. California Agriculture - 1980, p. 11; U.S. Department of Commerce, Bureau of the Census, 1978 Census of Agriculture, 1, Part 5, California, (Washington, D.C.: Government Printing Office, June 1981), p. 1.

82. Hal Rubin, "Who Owns Calfornia?" California Journal, June 1981, pp. 221-223.

83. 1978 Census of Agriculture, p. xiv.

84. 1978 Census of Agriculture, p. 3.

85. 1978 Census of Agriculture, p. 2.

86. Patricia Allen, "Where Are The Small Farms?" Small Farm News, University of California, Small Farm Center, August/September, 1982, p. 2.

87. Priscilla Salant and Robert D. Munoz, Rural Industrialization and Its Impact on the Agricultural Community: A Review of the Literature, U.S.D.A. Economics and Statistics Service Staff Report No. AGESS 810316 (Washington, D.C.: U.S. Department of Agriculture, April 1981), pp. 2-3.

88. Carole Frank Nuckton, ed., Farm-Size Relationships, With An Emphasis on California, California Agricultural Experiment Station, Giannini Foundation Project Report, University of California, December 1980, pp. 11, 142.

89. Thomas A. Miller, Gordon E. Rodewald, and Robert G. McElroy, Economies of Size in U.S. Field Crop Farming, U.S.D.A. Economics and Statistics Service, Agricultural Economic Report No. 472, (Washington, D.C.: Government Printing Office, July 1981), p. iii.

90. Carole Frank Nuckton, p. 8.

91. The Family Farm in California, Report of the Small Farm Viability Project, November 1977, pp. 11, 12.

92. U.S. Department of Agriculture, Economic Indicators of the Farm Sector, Economic Research Service, Statistical Bulletin No. 678, (Washington, D.C.: Government Printing Office, November 1981), pp. 174, 140, 11.

93. The Family Farm in California, p. 9.

94. U.S. Department of Agriculture, "Farm Real Estate Market Developments," Outlook & Situation, July 1982, p. 18.

95. 1978 Census of Agriculture, p. 3.

96. Tom Haller, "Small Farms and the Economic Crunch," Small Farm News, University of California, Small Farm Center, August/September 1982, p. 1.

97. Economic Indicators of the Farm Sector, pp. 134, 138, 140.

98. 1978 Census of Agriuclture, p. 1.

99. California Crop and Livestock Reporting Service, *California Vegetable Crops*, Annual Bulletin, 1979-1980, p. iv.

100. California Department of Food and Agriculture, *Fertilizing Materials*, Tonnage Report, 1979, p. 12; *Economic Indicators of the Farm Sector*, p. 137.

101. *Economic Indicators of the Farm Sector*, pp. 133-141.

102. George DeVault, "Testing...testing," series of articles in *The New Farm,* starting January 1982.

103. "Fertile Soils Need Less Nitrogen," *Agricultural Research* 31, No. 1-2, (July-August 1982), p. 15.

104. The Cornucopia Project, *Empty Breadbasket*? pp. 50-55.

105. George DeVault, "$500-a-Ton Anhydrous," *The New Farm* 4, No. 3 (March/April 1982), pp. 2-3.

106. Rudy Baum, "Spring will tell in California's Medfly battle," *Chemical and Engineering News* 60, No. 14 (April 5, 1982), p. 25.

107. "California Declares Medfly Has Been Eradicated," *Supermarket News* 32, No. 39 (September 27, 1982), p. 23.

108. California Department of Food and Agriculture, *Pesticide Use Report*, Annuals 1980 and 1981, p. 255 and p. 263.

109. *Basic Statistics 1977 National Resources Inventory*, Table 3; Theodore R. Eichers, *Farm Pesticide Economic Evaluation, 1981*, Economics and Statistics Service, Agricultural Economic Report No. 464, (Washington, D.C.: Government Printing Office, March 1981), p. 5.

110. Eichers, p.7.

111. Based on *Economic Indicators of the Farm Sector*, p. 138.

112. Eichers, p. 9.

113. David Pimentel et. al., "Benefits and Costs of Pesticide Use in U.S. Food Production," *BioScience* 28, No. 12 (December 1978), p. 772.

114. David Pimentel and Clive A. Edwards, "Pesticides and Ecosystems," *BioScience* 32, No.7, (July/August 1982), p. 595.

115. Pimentel and Edwards, p. 598.

116. Pimentel et. al.,"Benefits," p. 782.

117. The State of California Department of Food and Agriculture...and What It Does for You, p. 1.

118. "Food system employs one out of four workers," Chain Store Age/Supermarkets 58, No. 6 (June 1982), p. 12.

119. Telephone interview with Gerald Grinnell, U.S.D.A., Washington, D.C., December 1982.

120. Telephone interview with Larry Taber, President, California League of Food Processors, December 1982; California League of Food Processors, California Fruit and Vegetable Canning Industry Profile, November 1981.

121. Telephone interview with Larry Taber; California Fruit and Vegetable Canning Industry Profile.

122. Hal Rubin, "Who Owns California?" California Journal, June 1981, p. 223.

123. "Schuler: Changes in California industry affecting processing fruits," The Packer 90, No. 7, February 12, 1983.

124. Telephone interview with Gerald Grinnell, U.S.D.A., December 1982. California's population = 10% of U.S. total.

125. Marchant, p.i.

126. U.S. Department of Agriculture, Agricultural Statistics 1981, (Washington, D.C.: Government Printing Office, 1981), p. 192.

127. "Population: The Increasing Pressure," California Tommorrow, A Report of the California 2000 Project, Summer 1982, p. 14.

128. "1982 Census of Supermarkets," Progressive Grocer 61, No. 5 (May 1982), pp. 42-43.

129. Martin Halstuk, "Urban poor face 'crisis' in food supply," The Tribune, September 15, 1979; Joe Quintana, "State Acts in Food Crisis," Sacramento Bee, September 29, 1979.

130. George Estrada, "Community control sought for inner-city food project," Eastbay Today, January 22, 1980.

131. Telephone interview, Sharon Patrician, California Department of Social Services, Public Information Office.

132. Kathryn Johnson, "The Stakes Get Higher In Food Stamp Frauds," U.S. News & World Report 94, No. 5 (February 7, 1983), p. 52.

133. Food Losses and Wastes in the Domestic Food Chain of the United States, Final Report for Research Applied to National Needs, Research at Michigan State University (n.p. DAR 76-80693, 1979), p. 348.

134. Calculation based on total value of fruits, vegetables and nuts multiplied by 9 percent.

135. Roger Rapoport, "Garbaeology," Science 81 2, #4 (May 1981), p. 77.

136. David Pimentel et. al., "Benefits and Costs of Pesticide Use in U.S. Food Production," BioScience 28, No. 12 (December 1978), p. 781.

137. National Marine Fisheries Service, Data Management and Statistics Division, California 1980 Landings, 7-1-81.

138. Telephone interview with Al Petrovich, Marine Resources Branch, California Department of Fish and Game, January 1983.

139. California Food Imports chart.

140. Imports of Selected Fishery Products into California, 1979, Xerox, from California Department of Fish and Game, p. 32.

141. Telephone interview with Al Petrovich.

142. Telephone interview with L.B. Boydston, Chief, Anadromous Fisheries Branch, California Department of Fish and Game, January 1983.

143. Telephone interview with L. B. Boydston.

144. Timothy Pfaff, "California's Peripheral Canal," Environment 24, No. 3 (April 1982), pp. 29-30.

145. David Pimentel et. al., "Water Resources in Food and Energy Production," BioScience 32, No. 11 (December 1982), p. 864.

146. Pimentel and Edwards, p. 598.

147. "Direct Marketing Proves Its Worth," The New Farm, March/April 1981, p. 51.

148. The Council on the Environment of New York City, From Farm to City (New Brunswick: Rutgers University, Cook College; 1980), p. 2.

149. Charlyn Fargo, "Water, energy costs driving cattle back to Illinois farms," Crain's Chicago Business, Week of January 17-23, 1983, pp. 1, 40.

150. *California Food Imports* chart.

151. Calculations based on 46.7 workers/$ million final demand for beef and veal and 48.3 workers/$million final demand for pork. Telephone interview with Mr. Jerry Schluter, U.S.D.A.

152. Calculations based on data from:

> U.S. Department of Agriculture, *Estimating U.S. Livestock and Poultry Manure and Nutrient Production*, prepared for the Economics, Statistics, and Cooperative Service by Donald L. VanDyne and Conrad B. Gilbertson (Springfield, VA: National Technical Information Service, 1978);
>
> California Department of Food and Agriculture, *Fertilizing Materials*, Tonnage Report, 1979.

153. *Basic Statistics 1977 National Resources Inventory*, Tables 4 and 11.

154. The Cornucopia Project, *Organizing a Local Cornucopia Project: A Manual for Changing Your Food System*, (Emmaus, PA: The Cornucopia Project, 1982).

155. Rasa Gustaitis, "Water Conservation," *Cry California* 16, No. 3 (Summer 1981), p. 88.

156. "What's Ahead for Agricultural Research?" *Countryside*, April 1982, p. 28.

157. Citizens Advisory Committee on Salmon and Steelhead Trout, *The Time Is Now!* January 1975, pp. 54-55.

158. *The Family Farm in California*, p. 16.

159. "Small Scale Markets," *New England Farmer*, January 1982, p. 18.

160. "Land: The Irreplaceable Resource," *California Tomorrow* 17, No. 3 (Summer 1982), p. 31.

161. "Land: The Irreplaceable Resource," p. 30.

162 B. Delworth Gardner, "The Water Management Crunch: An Economic Perspective," in *Economics Ethics Ecology*, ed. Walter E. Jeske, (Ankeny, Iowa: Soil Conservation Society of America, 1981), p. 76.

163. Gardner, p. 76.

164. Gardner, p. 76.

165. Gardner, p. 76.

166. O. D. Forker, V.J. Rhodes, and E. M. Bonn, eds., Marketing Alternatives for Agriculture, (Ithaca: New York State College of Agriculture and Life Sciences, 1976).

167. U.S. Department of Agriculture, Marketing Slaughter Cows and Calves in the Northeast, Farmer Cooperative Service, Preliminary Report 14, (Washington, D.C.: Government Printing Office, n.d.).

168. Marchant, p.i.

169. The Family Farm in California, p. 16.

170. "Energy: An Essential Force," California Tomorrow, Summer 1982, p. 55.

171. The Time Is Now, p. 50.

172. The Time Is Now, p. 50.

173. For a more detailed explanation of these and other research topics, see "Research Agenda for the Transition to a Regenerative Food System," by Dr. Richard Harwood and Dr. Patrick Madden, available through The Cornucopia Project.

174. Gardner, p. 75.

175. 26 through 29 from: The Time Is Now, p. 51.

176. California Department of Consumer Affairs, California Agricultural Direct Marketing Guide, (Sacramento: Department of Consumer Affairs, 1979); Jeff Jacobs, "Direct Marketing Program," Small Farm News 1, No. 3 (October/November 1981), p. 8.

177. "Direct Marketing Association," Small Farm News 1,No. 3 (October/November 1981), p. 4.

178. California Department of Conservation, Farmland Mapping and Monitoring Program, September 1981.

179. "Land: The Irreplaceable Resource," p. 26; Robert Lindsey, "Napa Valley's vineyards feeling a squeeze," The Morning Call, August 2, 1981, pp. G1, G2.

180. People for Open Space, Endangered Harvest, The Report of the Farmlands Conservation Project, (San Francisco: People for Open Space, Inc., 1980).

181. "Tracking 1982 Farmland Protection Activities," Farmland Notes 2, No. 1 (January 1983), p. 1.

182. Agricultural Policy Challenges for California in the 1980's, The Report

of the University of California Agricultural Issues Task Force, University of California Special Publication 3250, 1978.

183. Jerry Lester, "New Focus for Small Farm Program," Small Farm News, January 1983, p. 1.

184. George Thurlow, "Rural studies offers different library," The Daily Democrat, October 1, 1980, p. C-20.

185. Sara Terry, "Trout, oysters, abalone: California's new 'crops'," The Christian Science Monitor 74, No. 199 (September 8, 1982), pp. 1, 14.

186. "California's EDB Standard Okayed; OSHA Readying New Federal Standard," Food Institute Report, January 22, 1983, p. 3.

187. "You Should Know...," Food Institute Report, January 22, 1983, p. 5.

188. "California processors save energy," Food Engineering, September 1982, pp. 116-123.

189. The State of California Department of Food and Agriculture...and What It Does for You, pp. 16-18.

190. Daniel A. Mazmanian, Agricultural Land Preservation in California: An Overview, California Institute of Public Affairs, September 1982, p. 3.

191. "California Farmlands Project," California Institute of Public Affairs, November 1982, p. 2.

192. "California Farmlands Project, " p. 2.

193. "California Farmlands Project," p. 2.

194. Mazmanian, p. 10.

195. Mazmanian, pp. 8-10.

196. Mazmanian, pp. 8, 9.

197. Mazmanian, p. 8.

198. The Agriculture Project, New Initiatives in Farm, Land and Food Legislation, A State by State Guide: 1979-1980. (Washington, D.C.: Conference on State and Local Policies, 1981), p. 5.

199. The Agriculture Project, p. 18.

200. The Agriculture Project, p. 26.

201. The Agriculture Project, p. 31.

202. The Agriculture Project, p. 31.

203. The Agriculture Project, p. 32.

204. The Agriculture Project, p. 35.

205. The Agriculture Project, p. 52.

206. The Agriculture Project, p. 52.

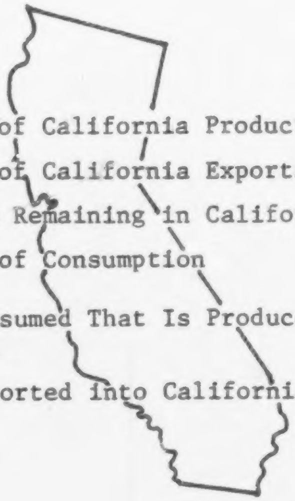
APPENDIX

INTRODUCTION TO FOOD IMPORTS CHART

California is the "Number 1" agricultural state in the United States. Approximately 10 percent of what goes into every shopping basket in the country comes from California. The state supplies 45 percent of the country's fresh vegetables and 53 percent of the processed vegetables. Fruits and nuts account for 50 percent of the nation's total. California agriculture is the most diversified in the world, and leads the nation in 49 commercial crop and livestock commodities.

Despite this, 41 percent of the food consumed by California residents is imported from other states and countries. Seven billion dollars actually leave the state each year to pay for these foods.

Much work needs to be done to ensure continued agricultural success. The huge amounts of food produced in California put a great deal of stress on the environment and natural resources. Maintaining the resource base should be given top priority. Increasing food production for in-state consumption should focus on meats, utilizing grazing lands for beef and by-products of the food industry for feedstuffs. Encouraging small and medium size farming units will also create a more flexible, diverse, and sustainable food system for California.



Total Retail Value of California Production	31,766,054.25
Total Retail Value of California Exports	19,201,148.49
Value of Production Remaining in California	12,564,905.76
Total Retail Value of Consumption	21,417,258.06
Portion of Food Consumed That Is Produced in California	59%
Percent of Food Imported into California	41%

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight[a] (1,000 lbs.)	PRODUCTION Retail Value (1,000 lbs.) (1979 dollars)	CONSUMPTION Retail Weight[b] (1,000 lbs.)	CONSUMPTION Retail Value ($1,000) (1979 dollars)	IMPORTS % Import	IMPORTS Retail Value of Import ($1,000)	EXPORTS % Export	EXPORTS Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
MEATS									
Beef	1,200,158.63	2,400,317.26	2,532,236.9	5,064,473.8	52.6	2,664,419.67			9,116,053[c]
Veal	15,010.46	105,073.23	47,067.6	329,473.2	68.1	224,399.98			[d]
Lamb & Mutton	38,346.9	87,430.93	35,300.7	80,485.60			7.9	6,945.34	11,767
Pork	51,033.45	102,066.9	1,652,072.1	3,304,144.2	96.9	3,202,077.3			1,502,397
POULTRY									640,760
Chicken	435,916.8	287,705.09	1,211,990.7	799,913.86	64.0	512,208.77			
Turkey	301,680	262,461.6	237,691.38	206,791.5			21.1	55,670.1	
Eggs	1,137,530.6	568,765.3	872,580.99	436,290.50			23.29	132,474.81	358,914
FISH[e]	263,652.4	790,957.2	375,364.11	1,126,092.33	30.0	335,135.13			
SHELLFISH	27,268.4	81,805.2	38,830.77	116,492.31	30.0	34,687.11			
DAIRY PRODUCTS									930,000
Fluid Market Milk	5,295,460.8	1,006,137.55	5,295,367.60	1,006,119.84					
Fluid Market Cream	249,773.0	52,452.33	74,752.72	10,448			70.0	42,004.33	
Cheese	1,148,955.98	1,585,559.26	566,223,23	781,388.06			50.7	804,171.20	
Condensed & Dry Milk	262,261.69	401,260.39	185,917.02	284,453.04			29.11	116,807.35	
Frozen Dairy Products	1,511,126.89	831,119.79	520,332.32	286,182.78			65.6	544,937.02	
Buttermilk	102,068.92	36,744.81	47,067.6	16,944.34			53.9	19,801.78	
Other Manufactured Products	814,490	NA[f]	407,245	NA			50.0	NA	
Butter	159,773.19	242,855.25	105,902.1	160,971.19			33.7	81,884.06	

continued on next page

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
FATS & OILS									
Lard	4,141.1	1,863.5	54,127.74	24,357.48					
Margarine	NC[g]		270,638.7	178,621.54					
Shortening	NC		444,788.82	284,664.84					
Oils	NC		550,690.92	737,925.83					
VEGETABLES, FRESH									
Artichokes	81,282	20,320.5	9,413.52	2,353.38			88.0	17,967.12	1,123
Asparagus	43,680	51,979.2	7,060.14	8,401.57			83.8	43,577.63	
Avacados	231,240	173,430.0	28,240.56	21,180.42			87.8	152,249.58	4,861
Beans, Green Lima	90,896	NA							
Beans, Snap	28,012	19,608.4	32,947.32	23,063.12	15.0	3,454.72			4,234
Broccoli	313,408.8	162,972.58	32,947.32	17,132.61			89.5	145,839.97	4,341
Brussel Sprouts	70,840	21,252.0	NC						
Cabbage	182,466	49,265.82	204,744.06	55,280.90	10.9	6,015.08			9,313
Carrots	716,493.95	179,123.49	143,556	35,889.05			79.96	143,234.49	5,308
Cauliflower	199,043.24	153,263.30	30,593.94	23,557.33			84.6	129,705.96	3,401
Celery	1,046,250	387,112.5	176,501.25	65,304.46			83.1	321,808.04	3,593
Corn, Sweet	113,528	39,734.8	174,150.12	60,952.54	34.8	21,217.74			19,942
Cucumbers	81,880	32,752.0	101,195.34	40,478.14	19.1	7,726.14			4,078
Garlic	149,526	297,556.74	25,887.18	51,515.49			82.7	246,041.25	2,458
Lettuce	4,052,382	1,175,190.78	628,352,46	182,222.21			84.5	992,968.57	24,422
Winter	894,400								
Spring	1,403,000								
Summer	1,220,000								
Fall	840,000								

continued on next page

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
VEGETABLES, FRESH (cont.)									
Mushrooms	77,776.96	121,332.06	63,541.26	99,124.37			18.3	22,203.77	
Onions	1,081,376	194,647.68	348,300.24	62,694.04			67.8	131,953.64	11,466
Pepper, Bell	137,448	114,081.84	82,368.3	68,366.14			40.1	45,715.70	5,034
Potatoes	2,007,552	281,057.28	2,824,056	395,367.84	28.9	114,310.56			78,895
Winter	79,200								
Spring	1,106,000								
Summer	269,600								
Fall	636,400								
Spinach	44,880	18,400.8	11,766.9	4,824.43			73.8	13,576.37	839
Sweet Potatoes	141,120	46,569.6	134,142.66	44,267.08			4.9	2,302.52	9,030
Tomatoes	571,710	354,460.2	298,879.26	185,305.14			47.7	169,155.06	16,886
Eggplant	NC		16,473.66	7,248.41					
VEGETABLES, PROCESSED									
Asparagus (total)	33,575.92		8,942.84						
Frozen	4,848.48	8,290.9	1,882.70	3,219.42			61.2	5,071.48	
Canned	28,727.44	40,505.69	7,060.14	9,954.79			24.6	18,772.64	
Beans (Total)	36,517.68		170,149.37						44,551
Frozen	4,028.56	1,611.42	28,946.57	11,578.63	86.1	7,550.07			
Canned	32,489.12	10,396.52	141,202.8	45,184.89	77.0	34,788.38			
Cucumbers (Pickles)	10,240.42	7,782.72	202,390.68	153,816.92	94.9	145,972.26			64,699
Peas, Green (Total)	48,476.09		116,256.97		58.3				29,654
Frozen	13,084.09	6,280.36	40,948.81	19,655.43	68.0	13,375.07			
Canned	35,392	13,448.96	75,308.16	28,617.1	53.0	15,168.14			
Spinach									
Winter (Total)	186,598.58		36,006.71						2,007
Frozen	68,135.63	25,210.18	17,179.67	6,356.48			74.8	18,853.7	
Canned	118,462.95	43,831.29	18,827.04	6,966.0			84.1	36,865.29	

continued on next page

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
VEGETABLES PROCESSED (Cont.)									
Tomatoes	5,611,329.9		555,397.68				90.1	1,949,762.06	
Canned Whole	1,905,660.4	666,981.14	129,435.47	45,302.57			93.0	621,678.58	
Catsup, Sauce, Pulp, Puree	2,715,768	1,194,937.92	360,067.14	144,026.86				1,050,911.06	
Tomato & Vegetable Juice	989,901.5	277,172.42	65,894.64	18,450.50				258,721.92	
Carrots	191,322.18		37,418.74						1,260
Frozen	117,796.77	50,652.61	25,651.84	11,030.29			78.2	39,622.32	
Canned	73,525.41	28,674.91	11,766.9	4,589.09			84.0	24,085.8	
Beans, Lima	135,392.61		21,415.76						5,726
Frozen	58,296.50	34,394.94	12,002.24	7,081.32			79.4	27,313.6	
Canned	77,096.11	43,173.82	9,413.52	5,271.57			87.8	37,902.25	
Broccoli									
Frozen	221,936.74	139,820.15	32,241.31	20,312.02			85.5	119,508.13	2,909
Cauliflower									1,080
Frozen	83,895.36	55,370.94	11,766.9	7,766.15			86.0	47,604.78	
Pumpkin & Squash									
Canned			14,120.28						
Corn			177,209.51						
Frozen	NC		47,773.61	23,409.07					
Canned	NC		129,435.9	49,185.64					
Onions									
Frozen	NC		17,650.35						
Olives	118,000	267,860							
Chili Peppers, dried	23,760	11,088							

continued on next page

5

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
FRUITS, FRESH									
Apples	489,600	269,280	418,901.64	230,395.90			14.4	38,884.1	18,481
Apricots	183,456	177,952.32	2,353.38	2,282.78			98.7	175,669.54	
Bananas	-0-		503,623.32	151,087	100	151,087			
Bush Berries									
Boysenberries	2,800								
Olallieberries	3,200								
Raspberries	1,000								
Cherries	63,112	47,334	14,120.28	10,590.21			77.6	36,731.18	
Citrus									
Grapefruit	366,660	146,664	174,150.12	69,660.05			71.8	77,003.95	9,357
Lemons	1,013,760	608,256	68,248.02	40,948.81			93.3	567,307.19	3,353
Oranges	2,706,300	974,268	287,112.36	103,360.45			89.4	870,907.55	19,839
Navel	1,513,200	544,752							
Valencia	1,193,100	429,516							
Tangerines	101,520	55,836	35,300.7	19,415.39			65.2	36,405.07	3,025
Dates	49,000	8,942.84							712
Figs	74,200		4,000.75						604
Grapes, Table	751,660	501,328	72,954.78	58,363.82					5,940
Melons									
Cantaloupe	745,384	268,338.24	169,443.36	60,999.61			77.3	207,338.63	11,434
Honey Dew	241,230	127,851.9							
Watermelon	280,440	86,936.4	294,172.5	91,193.48	4.7	4,257.08			14,371
Nectarines	326,800	774,516	32,947.32	78,085.15			89.9	696,430.85	1,674
Peaches	1,723,160	1,035,992.8	129,435.9	76,367.18			92.49	940,297.22	4,582
Pears	666,307.2	312,331.5	58,834.5	26,475.53			91.2	273,362.72	3,338
Pineapple	-0-		30,593.36	8,260.36	100	8,260.36			
Plums	332,500	119,700	40,007.46	14,402.69	12.3	1,771.53			3,297
Strawberries	316,480	330,820.8	42,360.84	40,666.41			86.6	263,154.39	1,118

continued on next page

CALIFORNIA FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
PROCESSED FRUIT PRODUCTS									
Dried Fruit									
Prunes	266,000	502,740	10,825.55	20,460.29			95.9	491,914.45	3,036
Raisins	604,600	961,314	44,008.21	69,973.05			92.7	891,340.95	17,513
Apricots	10,680	42,720	1,412.03	5,648.11			86.7	37,071.89	
Peaches	3,600	10,800	235,338	706.16			93.4	10,087.2	
Pears	3,060	9,180	235,338	706.16			92.3	8,473.14	
All Canned Fruits	2,273,800		442,435.44						
All Canned Fruit Juice			538,924.02						
Frozen Fruit Juice	93,600		289,465.74						
GRAINS									
Wheat, total									700,555
Wheat Flour	3,212,640	1,188,676.8	2,729,920.8	1,010,070.7			15	178,301.52	
Wheat Cereal	80,316	36,142.2	68,248.02	30,711.61			15	5,421.33	
Pasta Products	199,044	151,273.44	167,089.98	126,988.38			16.1	24,355.02	
Rye	NC		16,473.66	6,095.25					
Oats	149,600	91,256	75,308.16	45,937.98			49.7	45,318.02	4,279
Corn, Meal	NC		181,210.26	50,738.87					
Corn Cereal	NC	54,127.74	20,027.26						
Corn Starch	NC		44,714.22	23,698.54					
Barley	2,275,200	659,808	28,240.56	8,189.76					
Rice, Milled	3,367,000	3,097,640	216,510.96	199,190.08			93.6	2,898,449.92	33,567

continued on next page

CALIFORNIA FOOD IMPORTS

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1979 dollars)	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1979 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CA Consumption
SEEDS AND NUTS									
Dry Beans	252,000	118,440	150,616.32	70,789.67			40.2	47,650.33	122,525
Dry Peas	NC		9,413.52	2,824.06					
Peanuts	NC		14,826.29	16,308.92					
Tree Nuts									
Almonds (Shelled)	322,000	608,580	10,590.21	20,015.50			96.7	588,564.5	10,570
Pistachio	27,200	81,328							
Walnuts	396,000	1,184,040	11,766.9	35,183.03			97.0	1,148,856.97	5,417
Cane And Beet Sugar			2,143,929.18	643,178.76	99.2	340,286.91			
Sugar Beets	1,341,054	402,316.2							
Honey	32,272	41,953.6	30,593.94	39,772.12			5.2	2,181.59	
Coffee, Tea, Cocoa	NA		280,052.22	575,001.34					
Wine Grapes	3,230,000		894,039.49						85,899
TOTALS	75,158,833.79	$31,766,054.25	34,771,413.62	21,417,258.06		7,847,905.85		$19,201,148.49	14,002,487

Chart Notes

a. Production figures are taken from California Crop and Livestock Reporting Service publications and converted to retail weight by U.S. Department of Agriculture conversion factors.

b. California consumption is based on U.S. per capita consumption figures from Food Consumption, Prices, and Expenditures, U.S.D.A. Statistical Bulletin No. 656, 1981.

c. Land requirements based on: William Lockeretz, Agricultural Resources Consumed in Beef Production, Center for the Biology of Natural Systems, June 1975, p. 16.

d. Veal is a by-product of the dairy industry, so land area would be included in dairy products.

e. Production of fish and shellfish from California Department of Fish and Game.

f. Not applicable.

g. Data not collected by U.S.D.A., California Crop and Livestock Reporting Service or other sources.

Food-Related Organizations for Consumers*

Alternative Agricultural
Development Project
Dru Rivers
Dept. of Land, Air and Water
Resources
139 Hoagland Hall
University of California
Davis, CA 95616
(916) 752-7645

Appropriate Technology Farm
and Garden Project
Campus Activities Redwood Bldg.
University of California
Santa Cruz, CA 95064

California Agrarian Action Project
P.O. Box 464
Davis, CA 95617
(916) 756-8518

California Cooperative Federation
P.O. Box 195
Davis, CA 95616

California Department of Consumer Affairs
Cooperative Development Program
1020 N Street
Room 501
Sacramento, CA 95814

California Department of Food
and Agriculture
1220 N Street
Sacramento, CA 95814
(916) 445-5141

California Federation for Technology
and Resources
2018 P Steet
Sacramento, CA 95814
(916) 448-3851

California Green Thumb
401 Seventh Street
P.O. Box 1089
Petaluma, CA 94953
(707) 763-0652

California Institute for Rural
Studies
P.O. Box 530
Davis, CA 95617
(916) 756-6555

Campaign for Economic Democracy
409 Santa Monica Blvd., #214
Santa Monica, CA 90401
(213) 393-3701

Central Coast Counties
Development Corporation
1121-A North Main Street
Salinas, CA 93906
(408) 757-5231

Common Ground Garden Program
155 W. Washington Blvd. Room #606
Los Angeles, CA 90015
(213) 736-2445

Community Network for Appropriate
Technologies
1321 Cleveland Avenue
Santa Rosa, CA 95401
(707) 528-6543

Confederacion Agricola de
California, Inc.
2212 N. Main
Salinas, CA 94906
(408) 443-4550
or
P.O. Box 1154
Salinas, CA 93902

Cooperative and Communal Living
Network
P.O. Box 5446
Berkeley, CA 94705
(415) 849-1835

Earthwork-Center for Rural Studies
3410 19th Street
San Francisco, CA 94110

---

* This is a listing of some groups you may want to contact for further information.

Ecology Action of the Midpeninsula
2225 El Camino Real
Palo Alto, CA 94306
(415) 328-6752

The Farallones Institute
Rural Demonstration Education
Community
15290 Coleman Valley Road
Occidental, CA 95465
(707) 874-3060
and
Urban Demonstration Project
The Integral Urban House
1516 Fifth Street
Berkeley, CA 94710
(415) 525-3795

Friends of the Earth
124 Spear Street
San Francisco, CA 94105
(415) 495-4776

Greenpeace Foundation
Fort Mason, Building E
San Francisco, CA 94123
(415) 474-6767

Hunger Project
1735 Franklin Street
San Franciso, CA 94109
(415) 775-8100

Institute for Food and
Development Policy (IFDP)
1885 Mission Street
San Francisco, CA 94110

International Tree Crops
Institute U.S.A.
P.O. Box 1272
Winters, CA 95694
(916) 795-2440

Monterey County Pesticide Coalition
P.O. Box 3923
Salinas, CA 93912
(408) 757-6254

National Consumer Cooperative Bank
Western Region Office
620 Central Avenue
Bldg. 1
Alameda, CA 94501
(415) 273-7576

National Land for People
2348 North Cornelia
Fresno, CA 93711
(209) 233-4747

New School for Democratic Management
256 Sutter Street
San Francisco, CA 94108
(415) 543-7973

Northcoast Environmental Center
1091 H Street
Arcata, CA 95521
(707) 822-6918

Office of Appropriate Technology
1600 Ninth Street
Sacramento, CA 95814
(916) 445-1803

People for Open Space
46 Kearny
San Francisco, CA 94108
(415) 543-4291

Permaculture Institute
P.O. Box 1100
Winters, CA 95694

The Plan: Community Food Tree Nurseries
P.O. Box 872
Santa Cruz, CA 95061

Round Valley Agrarian Community
Development Corporation
Route 1, Box 44B
Covelo, CA 95428
(707) 983-6184

Sierra Club
530 Bush Street
San Francisco, CA 94108
(415) 981-8634

Small Farm Center
TB-102
Universtiy of California
Davis, CA 95616
(916) 752-6690

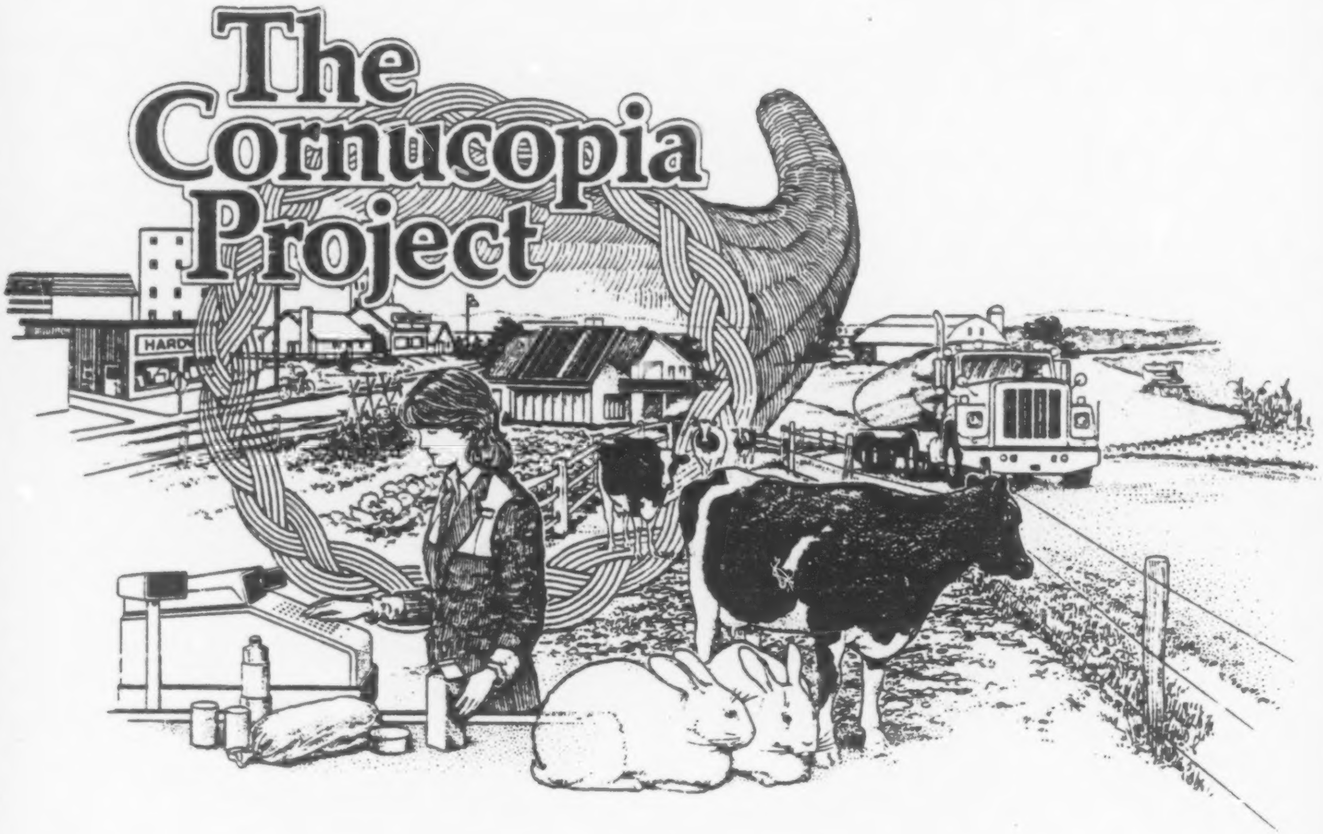
Steering Committee for
Sustainable Agriculture
P.O. Box 464
Davis, CA 95617
(916) 756-8518

Tree People
California Conservation Project
12601 Mulholland Drive
Beverly Hills, CA 90210
(213) 769-CONE

The Trust for Public Land
82 Second Street
San Francisco, CA 94105
(415) 495-4014

University of California Appropriate
Technology Program
2043 Bainer Hall
University of California
Davis, CA 95616
(916) 752-7166

6/12/83. C2111-1.15
a



The Colorado Food System:

AVERTING HARD TIMES IN HIGH COUNTRY

A Study of the Colorado Food System
by

PHILIP De BRUYN

and

The Cornucopia Project of the
Regenerative Agriculture Association
33 East Minor Street
Emmaus, Pennsylvania 18049
(215) 967-5171

1983

BEST AVAILABLE COPY

AVERTING HARD TIMES IN HIGH COUNTRY:

A Study of the Colorado Food System

by

Philip de Bruyn

with

The Cornucopia Project
of the
Regenerative Agriculture Association

33 East Minor Street
Emmaus, Pennsylvania 18049

TABLE OF CONTENTS

Introduction 1

Food Imports 3

Agricultural Land Use 5

Soil Erosion 7

Water. 9

Farm Expenses 12

Economics 13

Fertilizers 15

Food Availability and Waste 16

Recommendations 18

Footnotes 30

Appendix 35
  Food Imports Chart
  Organizations

Introduction

Agriculture is Colorado's biggest industry and a source of considerable pride for many Colorado residents. In 1980 there were 26,500 farms and ranches in Colorado, totalling 36.5 million acres. These farms and ranches produced cash receipts from farm marketings of just over $3 billion. Colorado produces crops of national importance, ranking third nationally in the production of storage onions, fourth in lettuce and tomatoes, sixth in pears and eleventh in all cattle and calves.

As bright a picture as these statistics may paint, it is not a complete picture. To get the complete picture, there are other statistics that must be considered.

* 44.5 percent of the food consumed in Colorado is imported from other states and countries.

* Transportation for imported food costs Colorado consumers about $3.8 million every year.

* Between 1967 and 1977, Colorado lost 700,000 acres of cropland to urban build-up and transportation and water uses.

* Each year 265 million tons of topsoil are eroded from Colorado's farmland -- enough to cover Denver with two feet of soil.

* The Ogallala Aquifer, the source of irrigation water for over 500,000 acres of Colorado farmland, is expected to be seriously depleted in 30 years.

These are symptoms of an unhealthy dependence on a system over which we currently have very little control. Our food is brought to our tables by a complex food system of farmers, harvesters, packers, shippers, processors, wholesalers and retailers. Many steps can be taken to improve this food system. This report will address some of the major issues confronting our food system, and will recommend ways of increasing local control of this complex system.

Our dependence on distant food sources makes us vulnerable to problems and weaknesses in the national system. Fluctuations in energy prices, heavy rains, early freezes and labor disputes are a few of the situations that could lead to prohibitively high prices for food or even shortages.

A strong food and agriculture system will benefit Colorado consumers in many ways. A regional food system is an insurance policy against the instabilities and weaknesses in the national system. Agriculture is an industry that provides jobs and economic benefit throughout the entire economy. Also, food grown closer to home is fresher and less expensive. Although it may not be easy, the people of Colorado can make changes in the structure of the food system. To this end, the recommendations section of the report is tailored for all of us. There are things that the consumer can do as well as the farmer, food industry, researcher, and local and state policy-maker. We all are in it together and it is together that we need to work to create the kind of food system that will assure our children and our grandchildren an affordable and secure supply of food.

Food Imports

Even though agriculture is Colorado's biggest industry, about 44 percent of the food we eat is imported from other states. While it may not surprise anyone that all of our oranges, bananas, artichokes and grapefruit are imported, it is surprising that we import 151 million pounds of fruits and vegetables that could be grown in Colorado.[1]

Food imports represent about $1.4 billion of our food expenditures. Since only 28 percent of this remains with Colorado's retailers, that means that one billion dollars leaves Colorado each year to pay for imported food.[2] Agriculture has a multiplier effect throughout the economy. According to a study by the Department of Commerce, every dollar of output from the livestock sector of farming generates $2.78 of total product throughout the economy on its way to final consumption.[3] Every dollar of output from the crop sector generates $1.81 of total product.[4] A strong farming sector not only generates income, but provides jobs for non-farm workers.

Buying food that is produced out-of-state means paying higher transportation costs. Each year about 3,785 trucks loaded with fruits and vegetables roll into Colorado from Texas, California, Washington, Arizona and other states.[5] It costs about $1,200 to ship a truckload of produce from California's Imperial Valley to Denver.[6] Colorado consumers pay for these transportation costs in the form of higher food prices.

Another aspect of importing our food is diminished quality. Much of the imported fruits and vegetables are picked prematurely before nutritional value is at its maximum, and ripened by ethylene gas in transit.

Studies have shown that vine-ripened tomatoes, for example, have 25 to 30 percent more vitamin C than those picked green and ripened in transit.[7]

But most importantly, our food supply is vulnerable. Because we depend on outside producers for our food, our supply is uncertain. An oil embargo or energy shortage, a labor dispute, a Med-fly invasion, a drought or crop failure in Florida or California -- any of these could lead to shortages. California produces over 40 percent of the nation's fresh fruits and vegetables and 53 percent of our processed fruits and vegetables.[8] Any failure along this supply line could have disastrous consequences.

These scenarios are not just fantasy. The oil embargo of 1973 had serious effects on food, including higher prices, unavailability of some food products, panic buying, and rationing of the products available.[9] A similar disturbance today would have equally serious consequences. Because of inflation and high interest rates, grocery store, warehouse and food processor back-up inventories are even lower than usual. Winter storm warnings often cause local stores to empty out. If something similar happened on a state-wide scale, many of us could soon be hungry. If a supply disruption lasted long enough, social order in food-short urban areas could even break down.

The current system of food imports costs the state valuable economic activity, costs the consumer money to pay for food of lesser quality and leaves our food supply vulnerable to disruptions. As the food system becomes more self-sufficient, Colorado will need to expand its food production as well as facilities for processing, storage and distribution.

Agricultural Land Use

Colorado is a popular state. Since 1970, the state's population has grown by thirty percent.[10] The Front Range alone is expected to gain a million people by the year 2000.[11] Forty percent of Colorado's total farm production comes from this heavily populated area, and competition for farmland is becoming keen.[12]

Statewide, the amount of cropland in Colorado has declined from 11.8 million acres in 1967 to 11.1 million acres in 1977.[13] Between 1960 and 1980, the Front Range alone lost 1.3 million acres of agricultural land to urban build-up.[14] Not included in these figures are the additional acres that are isolated or severely inhibited by the non-farming activities surrounding them.

Conversion of cropland to non-agricultural uses threatens the production potential and efficiency of the agricultural sector. Urbanization of rural areas reduces the intensity and efficiency of farming. Unfortunately, conversion of farmland goes unnoticed by most people. Today, nobody is faced with the consequences of a diminished farmland base. If we keep building on or paving over our best cropland, the land required to feed Colorado residents may not be available when we need it. Once paved over, an acre of cropland can no longer be used for growing crops.

The land most favored for development is also our most productive farmland. This prime farmland is level, well drained and requires few conservation measures. If agriculture is forced to move to more marginal land, farming will become more expensive. Marginal land requires careful management because it is prone to erosion, and it needs higher applications of fertilizers because it is less fertile than prime cropland. This makes farming on marginal cropland more expensive, and these increased costs are bound to be passed along to the consumer in the form of higher food prices.

The Colorado Department of Agriculture has studied the transfer of land from agricultural to non-agricultural use and has come up with the following conclusions.

1. Agricultural land transfer to other uses, with resulting production losses and environmental consequences occurs mainly on the Front Range. Speculation has already driven land prices above $3,000 per acre, which is far above its agricultural value.[15] This creates a strong incentive for farmers to sell out to developers. Boulder, Larimer, and Weld counties together are expected to lose 25,000 to 75,000 acres of agricultural land by 1990.[16] Between 1973 and 1977, Larimer County alone approved 125 subdivisions of land, requiring 10,000 acres of land to be taken out of agricultual production.[17] Current law stipulates that any agricultural land tract that is subdivided into lots of less than thirty-five acres is subject to review and regulation. But the soil conservation districts that deal with the reviews feel that their recommendations go unheeded and that reviews are often bypassed by developers and farmers alike.[18]

2. Decline in quality of agricultural land with resulting production losses and economic consequences occurs on the Eastern High Plains. Increasing soil erosion and decreasing ground water supplies make it difficult for farmers to make a living from farming. Farmers simply do not have enough money to invest in long-term conservation practices. State financial support for conservation

activities in Colorado is among the lowest in the nation.[19]

Currently, about 400,000 acres of cropland in the Eastern High Plains is irrigated with groundwater from the Ogallala aquifer. Since the Ogallala is not connected to any stream or river, it is essentially a non-renewable resource. If this 400,00 acres of irrigated cropland were to revert to dryland farming, the state's economic loss would be between $166 million and $677 million annually.[20]

3. On the Western Slope, farmers, ranchers, and orchardists face pressures on agriculture from the development of the energy industry. At present the primary issues are the movement of the labor force away from agriculture into the energy industry and the influx of people employed by the energy industry who are settling on agricultural land.[21]

Currently, land and water resources are sufficient for both the energy industry and agriculture. In the future, however, competition for land will be based on the rate of growth in the energy industry, the water supply policies of energy companies, and the extent to which energy resources are converted within the state.[22]

Soil Erosion

Conversion of farmland to non-agricultural uses is not the only way Colorado is losing its land. A more subtle, but no less severe loss is through soil erosion. Topsoil is the most fertile part of the soil. It contains most of the organic matter, stores more than half of all nutrients and holds water vital for maintaining soil structure. Formation of topsoil is a slow process that can take hundreds of years. Today we are losing more than 11 tons of soil per acre of cropland each year, more than twice the national average.[23]

Plowing fragile grass-lands, intense monoculture on marginal land, and lack of public and private conservation measures all contribute to the problem. Wind erosion alone damages 4.5 million acres of cropland above accepted erosion rates.[24] Wind, sheet, and rill erosion together cause the loss of 265 million tons of topsoil each year.[25] This is enough soil to cover Denver with over two feet of topsoil every year.[26] Each year, 50 million tons of nitrogen, phosphorus and potassium are lost from cropland because of erosion. The estimated annual replacement value for these soil nutrients is $6.8 billion.[27]

Erosion is getting worse. In 1967 half of the state's cropland and rangeland needed conservation treatment.[28] By 1977, the Soil Conservation Service estimated that more than two thirds of all crop and rangeland needed conservation treatment.[29] Part of this increase is due to marginal land being brought into production. In 1980, only 11 percent of Colorado's farms participated in agricultural conservation programs.[30]

To make matters worse, the proposed 1983 Soil Conservation Service budget will be cut by almost 25 percent.[31] Only $10 million of Federal money in block grants is budgeted to state allocators.[32] According to the USDA, ten times this amount is needed in order to have any significant effect on state conservation programs.[33] Farmers, already burdened by rising expenses and falling prices, cannot be expected to invest in long-term conservation programs of their own.

Water

Water is a very important input in agricultural production in Colorado. Two thirds of the value of crops generated in the state comes from irrigated acreage.[34] Ninety percent of the state's total water consumption is for agricultural production alone.[35] It is estimated that a decrease in irrigated acreage of 20 percent could cut the state's economy by $500 million a year.[36]

Colorado is legally entitled to use about eight million acre-feet of surface water per year (an acre-foot is about 326,000 gallons).[37] Additional water is provided by aquifers. Currently, Colorado uses between six and seven million acre-feet of water per year.[38] But water supplies are unevenly distributed. The South Platte River is over-appropriated; more water is required than the system can provide. At the same time, 325,000 acre-feet of water flow out of Colorado each year.[39] There are several ways of increasing Colorado's water supply: 1) increase regional water supply through diversions from the Western Slope; 2) increase municipal supplies by acquiring agricultural water; 3) reduce municipal demand through water conservation; 4) increase water supply by storing additional water and reducing the flow of water out of the state.

Different sectors of Colorado's economy vie for the state's water supply. Table 1 illustrates the quantity of water required to produce one dollar of output for each of Colorado economic sectors. Irrigated agriculture is by far the most extensive user of water of all the state's industries. Irrigated agriculture requires 3.5 times as much water to produce a dollar of output as its nearest competitor, livestock, and almost ten times as much water

Table 1

GALLONS OF WATER CONSUMPTIVELY USED TO PRODUCE ONE DOLLAR OF OUTPUT
(COLORADO, 1970)

Irrigated Agriculture	4,331
Livestock	1,241
Food Processing	613
Trade	128
Metal Mining	58
Dryland Agriculture	44
Electric Power Generation	35
Services	28
Other Manufacturing	28
University Education	23
Elementary and Secondary Education	22
Wood Products	19
Primary Metals	15
Industrial Minerals Production	13
Transportation, Communication, and Public Utilities	13
Chemicals	10
Mining Services	9
Petroleum Refining	9
Coal Mining	7
Petroleum Production	7
Natural Gas	6
Pipeline Transportation	5
Fabricated Metals	5
Electronics	2
Paper	2
Printing	2
Textiles	1

Source: An Economic Analysis of Water Use in Colorado's Economy, D. Lee Gray and John R. McKean, Colorado State University, December 1975.

as dryland farming. As the demand for water increases, irrigated acreages and irrigation water will tend to be used for activities that produce a higher economic output.

State-wide irrigated acreage has increased by 26 percent over the last 20 years.[40] Almost all of this gain is the result of the development of the Ogallala Aquifer in Colorado's eastern High Plains.[41] The Ogallala Aquifer lies under parts of six Plains states, and supplies irrigation water for this area. The Ogallala is currently being mined at a rate that will cause severe depletion in less than 30 years.[42] Withdrawal rates are up to 5 feet per year at some places, while natural recharge is no more than 2 inches per year.[43]

That water issues will become critical in the near future is apparent from the following. Conservative estimates set the water requirements to produce the crops and livestock to feed one person at 1,000 gallons/day.[44] This is equivalent to about one acre-foot per person per year. The state population is projected to reach 4 to 4.7 million by 2000.[45] That means consumption of 4 to 4.7 million acre-feet of irrigated water, about 2 million more than is used today, bringing the state's total water use above allocated limits.

Colorado State University and the Department of Agriculture are studying water efficient crops to evaluate their potential for production and processing in the state, but any significant results will take some time to reach commercial scale.[46] When dryland farming once again becomes the predominant production practice, farm management systems will need to be finely tuned to include practices like skip-row planting and land terracing to capture precipitation.

Farm Expenses

Increase in farm size, declining soil fertility, technological advancements and rising prices for agricultural inputs have put the farmer in a position today where he is becoming dependent on purchased inputs that cost him more money and yield him less income. Over the last half century, technology and the trend toward larger farm size have steered agriculture in a capital-intensive direction. At the same time, productivity has risen sharply, leaving the farmers with flooded markets, depressed commodity prices and high production costs. In western Colorado the force driving farmers to adopt capital intensive labor-saving methods is amplified as the energy industry lures labor away from agriculture.[47]

Farmers are caught in a "cost-price squeeze," the cost of farming increases while the prices farmers receive for their crops decrease. Between 1975 and 1980, total farm production expenses in Colorado increased by 92 percent, while net farm income dropped 12 percent.[48]

For many farmers, the only way to stay in business is to buy more land and increase production. Farmers usually borrow money to do this, using their land as collateral. This has been possible because farmland value has been steadily increasing. Between 1978 and 1981, Colorado's farm real estate debt rose 97 percent, from $1.08 billion to $2.14 billion.[49] During the same time period, farm real estate value in Colorado increased only 51 percent.[50]

Unfortunately, this strategy has not been particularly successful. Farm income still lags far behind farmers' production expenses. In addition, farmland prices are leveling off or dropping, making further refinancing questionable.

The average national farmland value declined by one percent between 1981 and 1982, the first decline since 1955.[51] Farmland values in the mountain states are still rising, but the change in real value, after adjustment for inflation, is actually decreasing. This could snowball into financial disaster for Colorado's farmers.

Economics

If the food system had a motto, it might be "bigger is better." In the past fifty years, farms have increased in size, food processors have become huge multinational corporations and local grocery stores are rapidly being replaced by statewide chains of "super stores."

In agriculture, evidence of this trend is easy to find. In 1978, 27 percent of the farms in Colorado sold 92 percent of the agricultural production, and 14 percent of the farms held over 70 percent of the total farmland.[52] In 1980, only 5.5 percent of the feedlots in the state marketed 57 percent of the cattle for slaughter.[53]

The growth of large farms raises questions about equity and flexibility. Bigger is not necessarily a better method of production. On grounds of efficiency alone, USDA research on United States field crop farms found the most efficient size in the Texas High Plains (similar to the Colorado High Plains) is 974 acres.[54] But 90 percent of this efficiency can be achieved by farms of 395 acres.[55] The income from the smaller farms however, is 30 percent lower.[56] One reason for the increasing farm size is the higher income derived from them. Bigger farms in the hands of fewer owners increases the vulnerability of the food supply, limits food diversity, and puts the decisions of what foods are grown and how much consumers pay for them in the hands of fewer farmers.

The kind of structural information cited above is harder to obtain for the food manufacturing industry. Examples rather than statistics must be used to reflect recent trends. Often processors merge, grow, and expand markets to the extent that they are virtually the only market available to the farmer for certain commodities. Fort Lupton Company contracted all the peas grown in Colorado and 50 percent of the snap beans.[57] Kunner Empson Canning Company contracted almost all the red beets in the state,[58] and Peabey Milling Company milled about 95 percent of the wheat milled in Colorado.[59] A decrease in the number of processors has several consequences. Fewer processors lowers competition in the processors' input market, and creates a market power imbalance, forcing farm prices down. Second, fewer processors makes farmers vulnerable to plant closings. If a processor closes, farmers may lose a major part of their market. Fort Lupton and Kunner Empson have recently gone out of business, and as a result none of the commodities which they processed are grown in Colorado anymore. Third, political power of these big companies is strong. An agricultural marketing bill introduced to give farmers more equitable leverage in the market was recently killed by lobby groups of two sugar companies and one brewing company that virtually control their input markets.[60] Finally, the growth of these giants costs the consumer out-of-pocket money. Nationally, monopoly overcharges in the food manufacturing industry are estimated to be over $10 billion or over 6 percent of food sales in 1975.[61] Thus, a declining number of processors can be linked to lower farm prices, declining crop diversity, increasing rigidity in the system and higher consumer food prices.

At the retailing end of the food system, concentration is also very high. In Denver, two supermarket chains, King Sooper and Safeway, have about 90 percent of the grocery retailing market and 80 percent of the meat retail market.[62] Statewide, King Sooper and Safeway capture about 75 percent of the retail market in food.[63] This is a recent trend and is growing fast. Both chains have opened about half of their stores since 1975.[64] Mergers of retail grocery chains, another method of gaining market share, have been linked to the relaxed attitude that United States antitrust agencies have been taking on food industry mergers since the mid-1970's.[65] These large grocery chains have the ability to use strategies not available to smaller grocery stores operating in one local market. This results in a decrease in competition and its consequences. A study undertaken for the U.S. Congress has concluded a positive relationship between relative market dominance of a grocery chain and its profits, and relative retail food prices. [66] Left unrestrained then, this trend could result in inflated retail food prices, unrelated to production costs or the well-being of farmers.

Fertilizers

Between 1975 and 1980 the direct application of nitrogen solution has increased by 216 percent , while the application of natural organic material has gone down by 84 percent. [67] Often application is in excess of the needed amount. Fertilizer companies provide the farmer with the services of collecting their soil samples and having them tested at commercial testing laboratories. In almost all cases where duplicate tests were run by the Colorado State University, deficiencies claimed by the commercial labs were not found by the University labs.[68]

The total amount of primary plant nutrients in mixtures and direct application material consumed in Colorado in 1980 totalled 186,000 tons of nitrogen and 48,777 tons of phosphorus.[69] This costly approach to fertilizing may not be entirely necessary. Annually, the amount of recoverable nutrients in the livestock and poultry manure production of the state, for example, could satisfy 18 percent of the nitrogen and 21.4 percent of the phosphorus requirement.[70]

The current supply of fertilizer material is not only expensive, but also unstable. Florida produces 75 percent of the United States' supply of phosphorus and its mines are estimated to last only another 30 years.[71] After that, phosphorus will come from foreign sources. Nitrogen fertilizer is made from a process that utilizes natural gas. Decontrol of natural gas could raise the prices for ammonia from $80 to $500 per ton.[72]

If prime farmland is taken out of production for non-agricultural uses, farmers will be forced to cultivate marginal farmland, which needs higher fertilizer applications to maintain production levels. By maintaining both the amount and quality of Colorado's farmland, farmers will be less dependent on distant and possibly unreliable fertilizer sources.

Food Availability and Waste

Despite the state's highly productive food system, there are still people in Colorado who cannot afford an adequate diet. In July 1982, 61,514 households were receiving food stamps.[73] Although the government annually spends more than $6.6 million on food stamp programs in Colorado,[74] it is estimated that 40 percent of those people eligible for food assistance do not participate.[75] As federal spending programs are trimmed, Colorado will need to develop ways to feed its needy.

While some Colorado consumers go hungry, food is being wasted. Each year in Colorado, approximately 58 million pounds of food worth $54 million are wasted as the result of damage and spoilage in transportation, wholesaling and retailing.[76] This much food would have fed 38 thousand people.[77] Prior to the introduction of the gleaning bill in Colorado in 1982, 38 million pounds of vegetables and 4 million pounds of fruit were plowed under each year.[78] The major reason for this was over-contracting by processors, with subsequent breaches of contracts, which left partially compensated farmers without a market for this excess production.

The Colorado food sytem has the capabilities to provide all Colorado consumers with an adequate diet. The different sectors of the system, from farmers to processors to wholesalers and retailers to consumers can achieve this goal only by working together.

RECOMMENDATIONS

Although there are many ways in which the current food system can be improved, only a few key issues will be dealt with here. The great diversity of concerns will prevent any generalizations and therefore the recommendations should be taken as guidelines needing adjustment before application. All the components of the food system need to be put into perspective. The increasing interdependence among the many different parts of the food system dictates a comprehensive approach to any problems. Too often the lack of any coordination between the different parts prevents solutions from being reached. The only way the whole can be bigger than the sum of the parts is by cooperation and coordination among all parts and at all levels. Effective cooperation needs comprehensive information available to all involved, and the use of that information to make plans and decisions with the input of all involved, toward a more flexible, economically viable and environmentally sustainable food system.

Major Themes

I. In-State Production for In-state Consumption

Colorado is currently in a relatively good position concerning interstate trade in agricultural and food products. Its inflow of export dollars far exceeds its outflow of import dollars. But there are trends in this structure which are unlikely to reverse and will cause negative consequences in the near future. First, Colorado relies heavily on the beef industry for its exports. This industry uses large quantities of water including feed production on irrigated acreage. Water in Colorado will become a scarce commodity in the near future, which will probably drive feed production out of this naturally dry state. This can make beef production uneconomical, thereby destroying the state's biggest agricultural sector. Movement toward greater diversity in the agricultural base should be initiated well ahead of the eventual change since much time is involved in changing the system. Second, transportation costs are rapidly increasing and will continue to do so. Therefore, the costs of a system that relies on in- and out-shipments of large amounts of food are rising and will eventually outweigh the benefits of shipping our food from distant sources. A system, therefore, that relies on production for local consumption will become more and more attractive in the future. Again, now is the time to evaluate and prepare. Third, many states are not as well off as Colorado in their balance of agricultural and food trade. As those states begin to work toward greater self-sufficiency, the market for Colorado exports, as well as the supply of its imports, will decline. We should be aware of this change and prepare alternative production systems that rely less on interstate trade.

Increased self-sufficiency will decrease transportation costs, energy usage and vulnerability to disruptions, while increasing the flexibility and resilience of the system. It will also improve freshness, taste, and nutritional value of products since premature harvesting and long distance transport will be minimized. The variety of fruits and vegetables in Colorado can be greatly expanded. Greenhouses, local processing and storage can be used to extend growing seasons and availability periods.

II. Encourage Local Markets

The benefits from local buying are the same as those mentioned for greater self-sufficiency. Both producers and consumers benefit. A USDA study on direct marketing in Colorado showed that local farmers received a 44 percent higher gross return if they sold locally through direct marketing rather than through wholesale channels.[79] Consumers also gained an average of 28 percent in decreased prices compared to supermarkets.[80] What are needed are locally conducted surveys of all producers willing to sell directly and all large volume buyers. This would help link sellers and buyers.

III. Maintain the Farm Resource Base

The farmers and the resources under their management are the most crucial part of our food system. Therefore, more attention should be given to the disappearance of farmers and farmland before a highly energy and capital-intensive, concentrated farm sector develops that has no desire for stewardship of resources entrusted in its hands. Soil erosion can be curbed through appropriate incentives and disincentives and expanded research on alternative farming practices. The decline of the family farm and the conversion of farmland can be curbed by legislative action and assistance, as well as careful evaluation of the side effects of government programs. The farm's supporting infrastructure of appropriate scale markets, input suppliers, extension services and credit sources needs to be maintained.

IV. Expand Consumer Education and Awareness

In our economic structure, the consumer is the ultimate entity that can exert great power over the direction of the food system. But for consumers to participate actively in food system issues, they need to be better informed about the system and its problems as well as possible solutions. Education, public information, and formation of consumer groups can channel the powers of consumer demand into an effective tool for change.

RECOMMENDATIONS TO THE STATE GOVERNMENT

1. Promote State Agricultural Production

   a. Offer incentives to farmers to diversify production with assistance from extension agents and low-interest state-guaranteed loans to make changes necessary for diversification. Expand investigation of the potential for various water-efficient crops. Start investigation of production potential of crops now imported into the state. Establish demonstration experiments to test crops, animals, and fish varieties suitable to the state's soil and climate, and develop farming techniques appropriate for smaller scale farms and less reliance on purchased inputs.

   b. Provide tax incentives for small-scale food producers, e.g. not taxing the first $10,000 of income from food produced for local consumption. Initiate programs to provide practical farm skills to small-scale commercial farmers.

   c. Organize a farmer linkage program whereby experienced farmers bring prospective farmers into their operation, easing the transfer of land ownership over time. In this way the new farmer would avoid costly farming mistakes while gaining the experienced farmer's knowledge of the operation.

   d. Encourage the formation of marketing coops for small farms to provide the necessary supplies for large buyers.

2. Farmland Preservation

   a. Publish guidelines to help local governments protect agricultural land and enhance farming. These guidelines would include ways to prevent "leap-frog" or random development, which removes from production not only the land that has been developed, but which in the long run isolates adjacent farming areas and inhibits certain farming activities. It could also include ways to protect farmland in urban fringes. such as agricultural zoning, transfer of development rights, community land trusts, etc.

   b. Institute a farmland capital gains tax which would discourage speculators from investing in farmland, and then re-selling it for development.

   c. Form a state chartered non-profit corporation that has the "right of first refusal" when farmland is being sold. The corporation can subsequently resell with restrictions to keep land in agriculture.

d. Monitor and record agricultural land transfer on an annual basis.

e. Promote family farms with a "Family Farm Security Program" including low-interest loans for the purchase of farm real estate.

f. Reduce capital gains taxes for farmers selling land to young and beginning farm operators.

3. Stop Erosion

a. Establish incentives to reduce erosion, including erosion taxes and prohibition of agricultural activities that result in erosion above a predetermined level.

b. Require a conservation plan for all agricultural lands larger than 25-35 acres.

c. Link assistance programs like loans, crop insurance, disaster relief, price-supports and state purchase of farm commodities to participation in conservation programs.

d. Encourage the use of rental arrangements which include provisions for sharing erosion control between the farmer and the owner.

e. Develop public awareness programs to promote the understanding of the need to support sound soil conservation.

4. Expand Local Markets

a. Develop and fund farmers' markets, including wholesale markets to supply large-volume purchasers.

b. Increase promotional efforts for direct purchase from farmers by supermarkets, restaurants, schools, hospitals, and other institutions. The existing ABC program could be expanded to to include institutional buying and direct marketing.

c. Provide assistance to small growers through a state-wide marketing clearing house.

d. Strengthen in-state food processing capabilities. Create incentives to attract new food processors who wish to reduce transportation costs by locating closer to major distribution centers. Establish community food processing and storage facilities for use by families and small commercial food producers to realize economies in equipment and energy consumption.

e. Recycle organic wastes to utilize their fullest potential. Inventory the state's types and amounts of organic wastes available and assess their potential to improve soil fertility and tilth and their potential for energy use. Develop incentives for using local organic waste as fertilizer and incentives for industry to separate toxic substances from their wastes so they can be safely used on cropland.

4. Promote the Understanding of Agriculture's Role in the Food System

a. Inititate educational programs on farmland preservation, energy conservation, reduced fertilizer and pesticide use, recycling organic wastes, and on energy use in different methods of farming and home food preparation.

b. Continue and expand the "Agriculture in the Classroom" program.

c. Promote nutrition education campaigns illustrating the relationship between diet and health.

RECOMMENDATIONS TO LOCAL GOVERNMENT

1. Create a greater understanding of the importance of agriculture to urban areas through educational programs. Offer seminars in agriculture, aquaculture, food preservation, storage, preparation, and nutrition. Encourage and expand the "Agriculture in the Classroom" program. Establish community gardens and community educational farms to be worked by farmers with interested citizens as labor.

2. Promote contract growing whereby groups of urban families, coops, or the city itself arrange to purchase food directly from local suppliers. Investigate the possibility of consumer/producer coops as an institutional framework for contract growing.

3. Encourage local industries that produce low-grade waste-heat to make use of this energy by producing food in attached greenhouses, or cultivating fish in warm coolant water.

4. Establish farmers' markets in the city, particulary in low income neighborhoods, and facilitate authorization for farmers to accept food stamps at the market. Assist in the formation of food cooperatives, coop stores, and preservation and storage centers by providing credit and guidelines.

5. Establish food banks to collect, store and distribute surplus food. The Colorado Clearing House in Denver is already active in setting up banks in cooperation and with financial assistance from the government.

6. Encourage government institutions to buy food supplies from local producers.

7. Develop an agricultural development council, comprised of people from the entire food system. This would focus on generating solutions to the problem of land conversion. It could develop local markets for local producers, hook up producers with purchasers, promote locally grown products with an expanded version of the ABC program, and initiate educational programs.

8. Investigate the Agricultural Land Evaluation and Site Assessment (LESA) system, now being developed by the Soil Conservation Service and the USDA. The program will assist planners in identifying farmland that should be protected, based on land capability, soil productivity and other important farmland ratings. The Colorado Department of Agriculture itself is currently developing more elaborate maps of the state's land resource and uses criteria such

as market proximity and supporting infrastructure to identify Logical Agricultural Units (LAU's).

9. Cooperate with local conservation districts, so that township supervisors enable the district to review subdivision plans for adequacy of erosion sedimentation control and stormwater management. Enforce greater evaluation of the Soil Conservation Service's reviews on subdivisions of agricultural land.

RECOMMENDATIONS TO FARMERS

1. Land Preservation

   a. Learn about the diversity of services and technical assistance available to farmers through local conservancies and land trusts, which can show the best options for future use of land, including land not essential for farm production. This kind of planning service would help the farmer realize certain economic benefits while still maintaining and preserving his farm operation.

   b. Preserve farmland by decreasing soil erosion, with the assistance of the local soil conservation districts. Reduce soil loss through structural and management practices, e.g. conservation tillage, terracing, contour farming, use of crop residues, and winter cover crops.

   c. Take land that is severely eroded out of production. Use marginal land for livestock grazing instead of crop production.

   d. Have soils tested accurately to determine nutrient value and fertilizer needs in order to prevent overuse of costly, energy-intensive fertilizers. Beware of inaccurate soil testing services.

2. Farm Inputs/Resources

   a. Diversify production with selected combinations and rotations of crops or an interplay of crops with livestock. This practice would reduce fertilizer and weed control costs while providing the farmer with greater market stability.

   b. Diversify not only types of crops but individual strains of a single crop as well so as to reduce the risk of pests blighting the entire crop.

   c. Reduce energy use by investing in more efficient machinery, especially irrigation pumps, and by letting crops dry naturally whenever possible. Investigate possibilities of using alternative energy sources, like manure conversion into methane, solar heat for crop drying, or wind power.

   d. Consider using management practices that will reduce the need for chemical fertilizers, pesticides, and other expensive inputs. Develop on-farm fertilizer sources by growing nitrogen-fixing legumes and green-manure crops.

   e. Avoid routine spray schedules. Apply pesticides only when needed and target spraying to delay onset of insect resistance, reduce undesirable residues, minimize damage to beneficial insects, and decrease costs. Consider alternatives to pesticide use, like integrated pest management. This involves monitoring pest levels for proper timing of application, no-tillage, crop rotations, interplanting, broadcast seeding or narrow rows, and biological control of pests to maintain the natural ecosystem.

3. Marketing/Economics

a. Organize marketing coops to provide restaurants, schools and other institutions with locally grown food. Work cooperatively with the consumer by selling directly to the public. Locate marketing centers strategically for the assembly, grading, packing, and distribution of the output of many small producers, thereby providing larger buyers with the volume and specifications they require.

b. Consider small-scale processing on the farm; such as processing sausage, curing meats, preserving, cheese making, etc. Fresh produce can be washed, sorted, and packaged for sale to restaurants and markets.

c. Encourage local newspapers, if not already provided, to devote space to farm problems and a listing of local and seasonal food availability.

RECOMMENDATIONS TO THE CONSUMER

1. Form a local Cornucopia Project, consisting of people who want to work at changing some aspect of their food system. Activities include establishing community gardens; cooperative food buying, storing, and preserving; forming food banks; gleaning farm fields after harvesting; and lobbying.

2. Purchase locally grown fruits and vegetables in season, taking advantage of peak nutritional value and decreased cost. Process and store these foods for winter consumption.

3. Purchase food directly from growers, thereby increasing their needed financial support as well as enjoying fresh and nutritious food at lower prices. Food coops can contract with farmers to produce for them.

4. Increase participation of the Cooperative Extension Service's Master Gardener program by expanding it to include storage, processing, marketing, growframes and greenhouses.

5. Start a land trust, a non-profit corporation, able to own real property or interest in real property. It can then purchase threatened critical agricultural property and sell it with deed restrictions to new farmers.

Notes:

1. See Colorado Food Imports Chart, p. 36 of this report.

2. U.S. Department of Agriculture, Economics and Statistics Service, Agriculture Economic Report No. 465, Developments in Farm to Retail Price Spreads for Food Products in 1980 (Washington, D.C.: GPO, 1981), p. 24.

3. M. C. Hallberg, "Testing for Change in Pennsylvania Agriculture: A Modeling Technique," Farm Economics, December 1981, p. 1.

4. Ibid.

5. Average truckload is about 40,000 lbs.

6. California Department of Food and Agriculture, Bureau of Market News, Fruit and Vegetable Truck Rate Report, 20 May 1982.

7. Robert S. Harris and Endel Karmas, Nutritional Evaluation of Food Processing (Westport, AVI Publishing Co., 1975), p. 103.

8. California Crop and Livestock Reporting Service, California Vegetable Crops, Annual Bulletin, 1979-80, p. iv.

9. William Serrin, "New York Area's Reliance on Imported Food Grows," New York Times, 26 July 1981, p. 1.

10. "Colorado's Diverse Agricultural Problems," Farmland, Vol. 2, No. 4 (1982), p. 1.

11. Ibid.

12. Steven W. Horn, Conservation in Colorado, A Program for Present and Future Needs (n.p.: State of Colorado Department of Natural Resources, n.d.), p. 14.

13. National Agricultural Lands Study, "Colorado Fact Sheet" (Washington, D.C. National Agricultural Lands Study, 1980).

14. Ibid.

15. Agricultural Land Conversion in Colorado, Vol. 1 (Denver, Colorado Department of Agriculture, 1979), p. 46.

16. Ibid., p. 45.

17. Ibid.

18. Horn, p. 14.

19. Agricultural Land Conversion in Colorado, p. 50.

20. Ibid., p. 51.

21. Ibid., p. 54.

22. Ibid., p. 55.

23. Ibid., p. 33

24. Horn, p. 4.

25. Agricultural Land Conversion in Colorado, p. 2; USDA, Soil Conservation Service, 1977 National Resources Inventory, revised 1980 (Washington, D.C. n.p. 1980), Table 16.

26. Denver has an area of 95.2 square miles.

27. Agricultural Land Conversion in Colorado, p. 32.

28. Ibid., p. 33.

29. Ibid.

30. USDA, Agricultural Statistics 1981 (Washington, D.C.: 1982), p. 519.

31. "Cuts in Soil Erosion Programs Worry Farmers," New York Times, 14 February 1982.

32. Ibid.

33. Ibid.

34. Agricultural Land Conversion in Colorado, p. 2.

35. Colorado Department of Agriculture, "Resource Analysis, Chapter IV, Water," draft copy, permission to quote secured, p. 1.

36. Agricultural Land Conversion in Colorado, p. iv.

37. "Resource Analysis," p. 5.

38. Ibid., p. 15.

39. Ibid., p. 5.

40. Ibid., p. 2.

41. Ibid.

42. "What to Do When the Wells Run Dry," *Science*, 14 November 1980, p. 754.

43. Ibid., p. 755, 756.

44. "Resource Analysis," p. 13.

45. Ibid., p. 14.

46. Colorado Department of Agriculture, *Update*, March 1982, p. 4.

47. *Agricultural Land Conversion in Colorado*, p. 57.

48. Colorado Department of Agriculture, *1982 Colorado Agricultural Statistics* (Denver: Colorado Crop and Livestock Reporting Service, 1982), pp. 64, 65.

49. *Agricultural Statistics 1981*, p. 475.

50. USDA Economic Research Service, *Farm Real Estate Market Developments Outlook and Situation*, July 1982, p. 14.

51. USDA, *Agricultural Outlook*, July 1982, pp. 18, 19.

52. U.S. Department of Commerce, Bureau of the Census, *1978 Census of Agriculture*, Vol. 1, part 51 (Washington, D.C.: GPO, 1981), p. 286.

53. Colorado Department of Agriculture, *1981 Colorado Agricultural Statistics* (Denver: Colorado Crop and Livestock Reporting Board, 1981), p. 150.

54. Thomas A. Miller, Gordon E. Rodewald, Robert G. McElroy, USDA, Economics and Statistics Service, Agricultural Economic Report No. 472, *Economies of Size in U.S. Field Crop Farming* (Washington, D.C.: GPO, 1981), p. 20.

55. Ibid.

56. Ibid.

57. Telephone interview with Jim Tippet, Colorado Department of Agriculture, 20 June 1982.

58. Telephone interview with Charles Bliss, Boulder County Extension Agent, 21 July 1982.

59. Telephone interview with Daryl Hanavan, Colorado Wheat Administration Committee, 6 August 1982.

60. Telephone interview with Dave Carter, Rocky Mountain Farmers' Union, 20 July 1982.

61. Willard F. Mueller, "The Control of Agricultural Processing and Distribution," American Journal of Agricultural Economics, 60 No. 5 (1978), p. 852.

62. "Consumer Analysis of the Denver Market," The Denver Post n.p., n.d.

63. Lee Lasson and Betsey Flannagan, "Coop Development in Colorado," The Synergist, 3 No. 3 (1982), p. 1.

64. Ibid.

65. Bruce Marion, "Government Regulation of Competition in the Food Industry," American Journal of Agricultural Economics, 61, No. 1 (1979), p. 180.

66. Mueller, p. 851.

67. Colorado Agricultural Statistics 1981, p. 111.

68. "Testing labs push excessive fertilizer," Rocky Mountain Farmers' Union, May 1981, p. 8.

69. Colorado Agricultural Statistics 1982, p. 57.

70. Donald L. Van Dyne and Conrad B. Gilbertson, Estimating U.S. Livestock and Poultry Manure and Nutrient Production (Springfield: NTIS, 1978), p. 20.

71. U.S. General Accounting Office, Report to the Congress by the Comptroller General of the United States, Phosphates: A Case Study of a Valuable, Depleting Mineral in America (Washington, D.C.: GPO, 1979), p. 14.

72. George DeVault, "Potassium: A Case of Too Much, Too Often," The New Farm, 4, No. 3 (1982), p. 31.

73. Letter received from Craig Forman, Regional Public Affairs Officer, USDA Food and Nutrition Service, Denver, CO, 20 August 1982.

74. Telephone interview with Craig Forman, 20 August 1982.

75. Telephone interview with Dave Bell, Department of HEW, Denver, CO, 21 August 1982.

76. Food Losses and Wastes in the Domestic Food Chain of the United States, (East Lansing: Michigan State University, 1979), p. 264.

77. USDA, Economic Research Service, Statistical Bulletin No. 694, Food Consumption, Prices, and Expenditures 1960-81 (Washington, D.C.: GPO, 1982), p. 2.

78. Telephone interview with Betsey Flannagan, Boulder Community Action Service, 20 July 1982.

79. "Direct Marketing Proves Its Worth," The New Farm, March/April 1981, p. 51.

80. Ibid.

APPENDIX

COLORADO FOOD IMPORTS

Agriculture is Colorado's biggest industry. In 1980 cash receipts from farm marketings in Colorado totalled just over $3 billion. Colorado produces crops of national importance; the state ranks third in production of storage onions, fifth in all sheep and lambs, sixth in dry beans and twelfth in turkeys. Despite these agricultural success stories, 44.5 percent of the food that is consumed in Colorado is imported from other states. In 1980 we imported 267 million pounds of fresh meats, vegetables and fruits that could have been grown in Colorado.

Colorado has the potential to increase its food self-reliance. In-state processing and storage facilities will help keep Colorado's agricultural production closer to home. A network of wholesale markets can provide large volume food purchasers with the quantities of food they require. Colorado's most productive farmland can be protected and preserved, to ensure vigorous agricultural land base for future generations. These and many other steps can be taken to provide Colorado consumers with a safe, secure, efficient and economical food system.

Retail Value of Colorado Production	$6,709,417,700
Retail Value of Colorado Exports	4,936,925,210
Value of Production Remaining	$1,772,492,490

55.5 percent of consumption produced in Colorado

Colorado imports 44.5 percent of its food

COLORADO FOOD IMPORTS

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight[a] (1,000 lbs.)	Retail Value (1,000 lbs.) (1981 lbs.)	Retail Weight[b] (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CO Consumption
Meats									
Beef	891,698.50	2,131,159.40	221,085.0	528,393.15			75.21	1,602,766.25	1,147,139.0[h]
Veal	Insignificant		4,335.0	13,308.45	99.0	13,175.37			
Lamb & Mutton	54,488.0	95,419.41	3,757.0	6,579.26			93.1	88,840.15	450,840.0[g]
Pork	85,815.0	131,296.95	197,387.0	302,002.11	56.52	170,691.60			172,889.0[f]
Poultry									
Chicken	4,200.48	5,208.60	144,500.0	179,180.0	97.09	173,965.86			34,484.0
Turkey	86,564.80	80,528.09	30,345.0	28,228.85			64.94	52,299.24	9,556.0
Eggs	60,577.80	32,480.01	99,994.0	53,613.80	39.42	21,134.56			18,147.0
Fish[e] (fresh, frozen, cured)	1,450.0	3,697.50	36,703.0	93,592.65	96.05	89,895.74			1,589.0[c]
Dairy Products[d]									
Fluid Milk and Cream	535,325.39	493,570.01	722,500.0	666,145.0	25.91	172,598.17			166,103.0
Butter	5,634.0	10,591.92	12,716.0	23,906.08	55.69	13,314.25			45,732.0
Cheese, hard	-0-		50,864.0	121,300.47	100.0	121,300.47			81,774.0
Cottage and Creamed	27,614.0	39,609.52	13,005.0	18,654.37			52.90	20,955.15	7,987.0
Evaporated and Condensed milk	-0-		20,519.0	37,919.11	100.0	37,919.11			3,959.0
Dry Milk Products	-0-		19,652.0	32,246.64	100.0	32,246.64			1,937.0
Frozen Dairy Products	15,219.0	9,676.24	76,007.0	48,325.25	79.98	38,649.09			33,848.0

Continued on next page

COLORADO FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1981 lbs.)	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CO Consumption
Vegetables, fresh									
Artichokes	NA		867.0	2,830.58	100.0	2,830.58			NA
Asparagus	399.78	629.73	867.0	1,365.70	53.89	735.98			397.0
Broccoli	92.0	47.77	4,913.0	2,550.83	99.98	2,550.31			1,068.0
Cabbage	51,800.0	14,504.0	24,276.0	6,797.28			53.14	7,706.72	658.0
Carrots	26,400.0	8,448.0	17,629.0	5,641.28			33.22	2,806.72	735.0
Cauliflower	953.78	663.07	3,757.0	2,611.87	74.61	1,948.82			1,057.0
Celery	Insignificant		21,097.0	7,172.98	99.00	7,101.25			467.0
Cucumbers	65.0	27.33	11,560.0	4,855.20	99.44	4,827.91			1,277.0
Eggplant	185.24	145.08	1,445.0	1,131.72	87.18	986.64			86.0
Garlic	31.60	86.76	2,312.0	6,347.83	98.63	6,261.11			220.0
Green Peppers	4,538.52	3,993.90	8,806.40	7,749.63	48.46	3,755.78			1,205.0
Hot Peppers	4,080.0		NC						
Lettuce	94,300.0	33,005.0	71,961.0	25,186.35			23.69	7,818.65	3,510.0
Mushrooms	Insignificant		34,095.30	61,712.49	99.00	61,095.37			
Onions	246,000.0	63,960.0	29,478.0	7,664.28			88.01	56,295.72	983.0
Potatoes	1,254,500.0	288,535.0	142,477.0	32,769.71			88.64	255,765.29	8,245.0
Snap Beans	-0-	-0-	3,757.0	3,043.17	100.0	3,043.17			621.0
Spinach	8,600.0	5,978.72	2,023.0	1,406.39			76.48	4,572.33	259.0
Sweet Corn	30,400.0	13,376.0	19,047.0	8,392.56			37.26	4,983.44	2,008.0
Sweet Potatoes	Insignificant	-0-	9,826.0	5,966.35	99.0	5,906.69			921.0
Tomatoes	13,000.0	6,292.0	32,946.0	15,945.86	60.54	9,653.94			1,525.0
Vegetables, canned and frozen									
Asparagus	NC		1,040.40	1,487.77					580.0
Beets	NC		3,468.0	1,312.29					156.0
Broccoli	NC		4,046.0	4,165.76					1,076.0
Brussels Sprouts	NC		722.50	661.23					69.0
Carrots	NC		4,132.60	2,871.70					531.0
Cauliflower	NC		1,329.40	1,555.93					492.0
Lima Beans	NC		2,225.30	1,986.74					757.0
Peas	NC		13,987.60	11,637.66					3,814.0

Continued on next page

COLORADO FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1981 lbs.)	Retail Weight 1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CO Consumption
Vegetables, canned and frozen (cont.)									
Onions			1,964.90	1,489.03					81.0
Pickles	61,850.88	34,834.41	19,941.0	11,230.77			67.76	23,603.80	1,127.0
Potatoes	NC		69,360.0	45,853.98					9,440.0
Pumpkin/squash	NC	1,156.0	478.12						124.0
Sauerkraut [1]	742.0	365.66	3,468.0	1,709.03	78.61	1,343.47			175.0
Snap Beans	6,542.64	3,339.36	20,808.0	12,222.62	72.68	8,883.40			2,723.0
Spinach	NC		3,612.50	2,225.30					566.0
Sweet Corn	NC	23,339.70	12,735.77						5,013.0
Sweet Potatoes	NC		2,890.0	1,627.65					315.0
Tomato Products	5,376.80	2,579.31	66,759.0	32,025.03	91.95	29,447.01			5,836.0
Fruits, fresh									
Apples	70,000.0	42,700.0	46,240.0	28,206.40			33.94	14,493.60	9,980.95
Apricots	623.65		NC						
Bananas	NA		60,112.0	29,836.96					NA
Cantaloup	10,600		NC						
Cherries, sweet and tart	3,200.0	5,603.84	1,734.0	3,036.58			45.81	2,567.26	1,836.04
Citrus fruits	NA		80,341.90	42,695.28					NA
Grapes	83.58	77.73	10,404.0	9,675.72	92.0	8,901.66			13,448.95
Melons	15,725.0	6,919.0	48,841.0	21,490.04	32.20	6,919.80			4,933.34
Peaches & Nectarines	18,000.0	10,260.0	20,230.0	11,531.10	11.03	1,271.88			10,519.60
Pears	9,200.0	4,258.18	6,936.0	3,210.30			24.61	1,047.88	1,886.73
Plums & Prunes	936.23	1,664.24	4,335.0	7,705.90	78.41	6,042.20			1,021.73
Strawberries	11.33	10.31	4,913.0	4,474.11	99.77	4,463.80			1,983.87
Raspberries	12.97		NC						

COLORADO FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value (1,000 lbs.) (1981 lbs.)	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of CO Consumption
Fruits, processed									
Frozen fruits	NC		8,005.3	13,384.86					
Frozen citrus juices	NA		28,611.0	40,787.84					
Canned & Chilled Fruit	NC		50,286.0	34,073.79					
Canned & Chilled Fruit Juices	NC		66,845.70	63,648.25					
Dried Fruits	NC		8,496.60	26,094.75					
Grains and Legumes									
Barley	74,419.34	38,636.02	3,468.0	1,800.59			95.34	36,835.43	1,112.0
Corn; flour, meal, creal, and starch [l]	140,116.03	105,446.72	45,662.0	34,363.72			67.41	71,083.0	13.234.0
Oats	2,964.3	2,060.78	8,959.0	6,228.30	66.91	4,167.36			5,656.0
Rye	1,344.0	484.43	2,023.0	729.17	33.56	244.71			1,416.0
Wheat; flour and cereal [k]	5,582,480.4	2,669,342.80	344,277.0	164,850.05			93.82	2,504,482.75	224,124.0
Dry edible beans	216,000.0	112,147.18	18,785.0	9,753.17			91.30	102,394.01	10,378.0
Dry field peas	2,381.15	1,236.30	1,156.0	600.20			51.45	636.10	803.0
Fats and Oils									
Lard	7,129.24	4,705.30	7,225.0	4,768.50	1.33		63.42		
Sweeteners									
Cane and Beet sugar [j]	404,586.0	186,109.56	241,604.0	111,137.84			40.28	74,971.72	42,281.0
Honey	2,340.0	3,706.56	3,468.0	5,493.31	32.53	1,786.97			
TOTALS	10,140,598.43	6,709,417.7	3,464,218.10	3,191,400.36		1,069,124.09		4,936,925.21	

Colorado Food Imports Chart

Notes

a. Production data from Colorado Agricultural Statistics 1981, unless otherwise noted.

b. Consumption data from Food Consumption, Prices and Expenditures (Washington D.C.: GPO, 1981).

c. Acreage requirements from Steve Van Gorder, Rodale Research Center.

d. Dairy products acreage equivalents information from Mr. Carmen, USDA Dr. Crim, Colorado State University.

e. Estimates for fish production from Eddy Kochman, Colorado Division of Wildlife, Fisheries Department.

f. Pork acreage equivalents information from Dr. Wilson, Colorado State University.

g. Lamb acreage equivalents information from Dr. Swanson, Colorado State University.

h. Beef acreage equivalents information from Dr. Stanton and Dr. Lamm, Colorado State University.

i. Production weight given in terms of sauerkraut.

k. Wheat production from Colorado Grain Flow Survey Calendar Year 1981, M. Conklin and E. Moore.

l. Corn Production from Colorado Grain Flow Survey 1981.

ORGANIZATIONS INVOLVED IN FOOD AND AGRICULTURE

Consumers

Colorado Clearing House
4877 Packing House Road, Unit 112
Denver, CO 80216
(303) 825-2324

Colorado Cooperative Food Movement
c/o Betsey Flannagan
Boulder County Community Action Program
2006 Broadway, 3rd Floor
Boulder, CO 80302

Care & Share Program
J. J .Cook
Colorado Springs
(303) 634-2301
(Information on foodbanks in Colorado Springs and elsewhere)

Social Concern Cooperative Care Center
c/o Ascension Episcopal Church
420 West 18th Street
Pueblo, CO 81003
(303) 543-4253
(Emergency food assistance)

Master Gardeners Program
Cid Campbell, Director
P.O. Box 543
Fort Collins, CO 80522
(303) 221-7580

Sue Anderson
Department of Economics
AG. Clark Building
Colordo State University
Fort Collins, CO 80523
(303) 491-5706
(direct marketing information)

Producers

Colorado Farm Bureau
Dean Kittel
P.O. Box 5647 TA (80217)
Denver, CO 80217
(303) 455-4553

Colorado Greenhouse Growers
Association
Al Schmidt
Berthoud Rose Farm
Box 577
Berthoud, CO 80513
(303) 433-6423

Colorado National Farmers
Organization
George Davis
3978 West Road 9 North
Del Norte, CO 81132

Colorado Soil Conservation Board
Allen Campbell
618-A Centennial Building
1313 Sherman Street
Denver, CO 80203
(303) 866-3351

Colorado State Grange
Jean Davies
51 West 84th Avenue
Suite 230
Denver, CO 80221

Denver Agricultural & Livestock Club
James Dean
5995 South Syracuse
Suite 200
Englewood, CO 80111
(303) 694-0951

Farmers Marketing Association
Ernie Unrein
4545 Madison Street
Denver, CO 80216
(303) 893-8866

National Farmers Union
George Stone
12025 East 45th Avenue
Denver, CO 80251
(303) 371-1760

Rocky Mountain Farmers Union
John Stencel
4605 Paris Street, Box 39628
Denver, CO 80239
(303) 371-9090

Western Colorado Fruitgrowers Association
Bill Wyatt
c/o Bookcliff Orchard
688 27 ½ road
Grand Junction, CO 81501
(303) 242-2686

Women Involved in Farm Economics
Mary Carlson
Stoneham, CO 80754
(303) 735-2321

Food Industry

Rocky Mountain Food Dealers Association
1015 Kipling Road
Lakewood, CO 80215

Associated Grocers of Colorado
P.O. Box 5528 T.A.
Denver, CO 80217

Colorado/Wyoming Restaurant Association
1365 Logan Street
Denver, CO 80203
(303) 534-2972

Potato Administrative Committee
Mary Shields
2601 West 10th Street, Suite 3
Greeley, CO 80631
(303) 352-5231

Colorado Apple Administration Committee
Dan Schaefer
10755 West Iliff Avenue
Lakewood, CO 80227
(303) 988-3769

Colorado Beef Promotion Board
Gerald Plowman
34 Princeton Circle
Longmont, CO 80501
(303) 776-4248

Colorado Meat Dealers Association
Roger Gifford
789 Sherman Street #380
Denver, CO 80203
(303) 837-1280

C8111-1.16

THE NEW HAMPSHIRE FOOD SYSTEM:
WORKING TOWARD SELF-RELIANCE

A Study of the New Hampshire Food System

by

Lydia J. Stivers

and

The Cornucopia Project of
The Regenerative Agriculture Association
33 East Minor Street
Emmaus, Pennsylvania 18049
Phone (215) 967-5171

This study was funded in part by the Jessie Smith Noyes Foundation

TABLE OF CONTENTS

PREFACE 1

INTRODUCTION 2

IMPORTS/EXPORTS 3

LAND AND PEOPLE 4

FARMING EXPENSES 8

ENERGY 8

AGRICULTURAL INDUSTRIES 10

- a. Dairy and Beef 10
- b. Pork and Lamb 12
- c. Poultry and Eggs 12
- d. Fruits and Vegetables 13
- e. Fisheries 14

CONCLUSION 14

DIRECT MARKETING OF PRODUCE IN NEW HAMPSHIRE. 15

WHAT'S BEING DONE 18

RECOMMENDATIONS 21

RECOMMENDATIONS FOR A NEW HAMPSHIRE FOOD POLICY 33

APPENDIX 39

- Food Imports Chart 40
- Notes to Imports Chart 45
- Food Related Organizations for Consumers 46

Preface

Let me here make a few important comments about this study. Although this report does summarize the state of the New Hampshire food system and point out both general and specific areas in which we can make the system more stable, it does have its limitations. I strongly urge readers of this study to take these limitations into account when reading and relating the information in this report so that it can truly be a helpful tool in the stabilization of the New Hampshire food system.

1. This report shows that New Hampshire imports 63-72 percent of its total food. This percentage, however, does not reflect the actual percentage of imports, but our net imports. Very probably this estimate is too low. New Hampshire actually imports the same foods it exports, for example milk and produce; this is a function of the national marketing system. Earlier studies have estimated that New Hampshire imports 85 percent of its food; I do not interpret the results of this study to mean that New Hampshire imports significantly less food now than in the seventies, when these studies were done.

2. No one really knows what goes on in the New Hampshire food system. All figures are ultimately estimates; some are more accurate than others. Thus this study is an attempt to fit together the better-known parts to come up with a coherent picture. For example, there are no specific figures on food consumption levels in New Hampshire; national per capita averages are used. No one knows how accurate this is; it does not, however, take into account such differences as the tourist industry and the profound effects that has on what foods are consumed in New Hampshire. Also, no one really knows how much cropland is left in New Hampshire, or how much potential cropland is still available.

3. Production figures for each food item do not take into account home production and home storage, except for some meats. Admittedly, these are small amounts at this point, and probably would not significantly affect the overall percentage. However, home production and storage of foods may well be the area of greatest potential in developing food self-reliance. Therefore, it would make sense to monitor this aspect of the food system and create ways to increase this kind of production.

Introduction

The many miles of stone walls found rambling through the backwoods of New Hampshire remind us that once this was in fact an agricultural state. During the mid-to-late 1700's, much of the land which is now in immature forest was producing grains, vegetables, fruits and livestock; all things necessary to support the hundreds of self-sufficient farms across the state.

In the next century, starting in the 1830's, many New Hampshire farmers were drawn away from their farms, either to take up work in the factories and mills run by the multitude of swift streams and rivers in New England, or to travel west where richer land was there for the breaking. Those left soon began to specialize in dairy farming to provide the growing New England populations with fluid milk.[1]

In the years between 1910 and 1980, New Hampshire had more than doubled its population while retaining only one third of its cropland. Cropland was lost through both reafforestation and development. As nation-wide transportation became cheaper and faster, New Hampshire became almost completely dependent on those states which have had economic and environmental advantages in food production: California and the deep South for fruits and vegetables, the Midwest for grains and meat, and the Great Lakes states for milk and milk products.[2]

Today New Hampshire imports between 63 and 72 percent of its food. That percentage translates into about 380,000 tons of food imported per year. In 1981, an estimated $740,338,840 left New Hampshire to pay for these imports.[3] If that money had stayed within the state, it would have generated $1,628,745,400 in state and local business.[4] Since 5 percent of the retail value of food represents transportation costs, it cost around $37,016,942 to truck those imports to retail stores in New Hampshire.

Using current production systems and techniques, it would take 884,572 acres of cropland, excluding pastureland, to produce the food consumed in New Hampshire. In 1978 the estimated total cropland in New Hampshire was 136,000 acres,[5] a scant 15 percent of the necessary acreage.

Fortunately, the state of the food system has been an important concern in New Hampshire since the mid-seventies. Consequently, a large number of public and private organizations and state and university officials are working toward finding ways to make New Hampshire's food system more secure. And there are important indications that New Hampshire is, albeit slowly, developing a regionalized food and agriculture system, including a rise in the number of farms and the number of part-time farmers since the early 1970's, a greater use of direct marketing channels, and the emergence of some agricultural pioneers, including fruit and vegetable growers and even a cheese-maker.

New Hampshire is far from being food self-sufficient. And considering current rates of population growth and the amount of land available, it probably never will be. But New Hampshire could be, and indeed must be, a great deal more self-reliant. We are moving in that direction, but it will take a greater effort and awareness on the part of consumers, business people, producers, and state and local officials before we can feel more secure about where our food is coming from. In New Hampshire, we need to attack the problem from a number of fronts. It is clear that we need to produce more of our own food and become less dependent on the national food pipeline. But to do that we also need to become responsible consumers. We need to change the foods we eat and orient our diets around the seasons and what can be produced and stored in New Hampshire. We need to support local producers by patronizing direct marketing outlets even more than we do now. We need to become individually responsible for our food supply by producing at least a part of our food ourselves. No commercial operation can match the yields of a well-tended garden, nor provide fresher, healthier meat, eggs, and milk than home-raised livestock.

Imports/Exports

New Hampshire's imports and exports immediately point out areas in which the food system could be strengthened. New Hampshire produces about 6 percent of its meat, fish, poultry, and eggs. Currently these are produced in a large part using imported grains. If we expanded and improved our pastureland and switched to meat-producing systems which are based on grazing rather than grain-fattening, we could potentially produce more of our own meat. New Hampshire's dairy industry exports fluid milk, but since there are no in-state processing plants, all milk leaves the state for processing and packaging before it is sold in New Hampshire stores. Some New Hampshire milk is made into ice cream, but we import virtually all of the other dairy products, including butter. A more locally-based dairy industry, including a number of small processing plants, could make us more secure in this area.

Although New Hampshire exports around 15,000 tons of apples per year, as well as a small amount of soft fruits and vegetables, including 46,000 tons of potatoes, it imports most of its fresh fruits and vegetables and virtually all of its processed fruits and vegetables. The chart figures are somewhat misleading here. For example, they show that New Hampshire exports asparagus. This is true; however, it exports a great deal of it during a certain portion of the season, and imports it, both fresh and processed, during the rest of the year. This is true for other items as well. New Hampshire exports potatoes, but imports other varieties that aren't grown in New Hampshire. The same is true for apples; we export MacIntosh but import Delicious, Cortlands, Granny Smiths, etc. Thus the estimate that New Hampshire imports 63 to 72 percent of its food is a low estimate; likewise the export estimates are probably low. The marketing system is such that food that is raised in New Hampshire, regardless of whether the state imports or exports that food item, is not necessarily consumed in New Hampshire.

There is great potential in the area of fruits and vegetables to improve our food import/export ratio. A great amount of land in New Hamsphire is well suited to growing vegetables and soft fruits.[6] And if done on a small scale, with proper management, vegetable growing could produce very high yields. One of the biggest obstacles here is the current marketing system; small-scale regional fruit and vegetable production would arise only if there was an extensive, stable, direct marketing system. Also, New Hamsphire needs processing plants so that we can store the fruits and vegetables we do raise, instead of importing all processed fruits and vegetables.

And, although it is quite possible to grow grains and legumes in New Hampshire (see, "Small Grains," UVM crop report; New England Farmer, June 1982; and Soybean Production in New Hampshire, UNH INER Research Report #75, 1979), New Hampshire imports all its grains, including feed grain, and legumes. We import almost all our fats and oils, but export maple syrup.

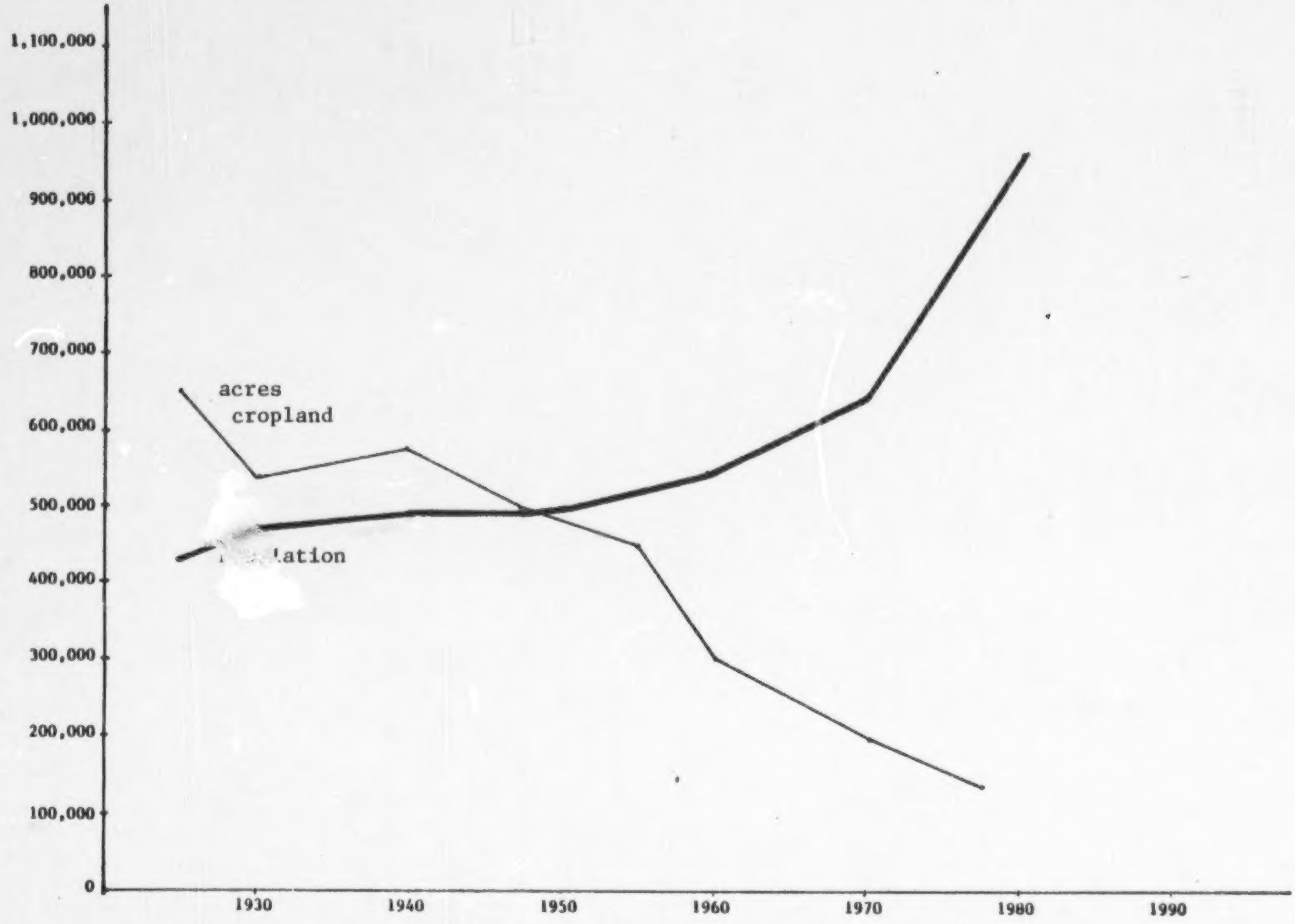
Of course, what New Hampshire produces not only depends on available resources but also on economics. In general, meats and grains can still be produced and shipped to New Hampshire at a cheaper price than if they were produced in New Hampshire. This used to be true of fruits and vegetables from the South and Southwest, although it is questionable whether it still holds today. However, what is not economical today may be economical tomorrow. As production and transportation costs rise over the entire country, and we pay more and more money for our food, we may find it profitable and beneficial to produce once more things which haven't been produced in New Hampshire in decades.

Land and People

Figure 1, "Population vs. Available Cropland in New Hampshire, 1930-1980," shows clearly the trend that as our population soars, we lose more and more of our cropland.

New Hampshire is the fastest growing state in New England, the second fastest east of the Mississippi, and the eleventh fastest in the nation.[7] From 1900 to 1950 New Hampshire's population grew at 5 percent per year, which was half the New England rate and one third

Figure 1 Population vs. Available Cropland in New Hampshire, 1930 - 1980



Source: Recommendations for a New Hampshire Food Policy.

the national rate. The population grew tremendously in the years between 1950 and 1979, from 53,000 people to 877,000. Since 1960, while the national growth rate averaged 1.14 percent, New Hampshire's population grew 2.3 percent per year.[8] However, the entire state did not grow at the same rate. Sixty percent of this increase occurred in the southern section in Hillsborough and Rockingham counties, where much of New Hampshire's best farmland lies. The Lakes region showed moderate growth, but the north country grew slowly.[9]

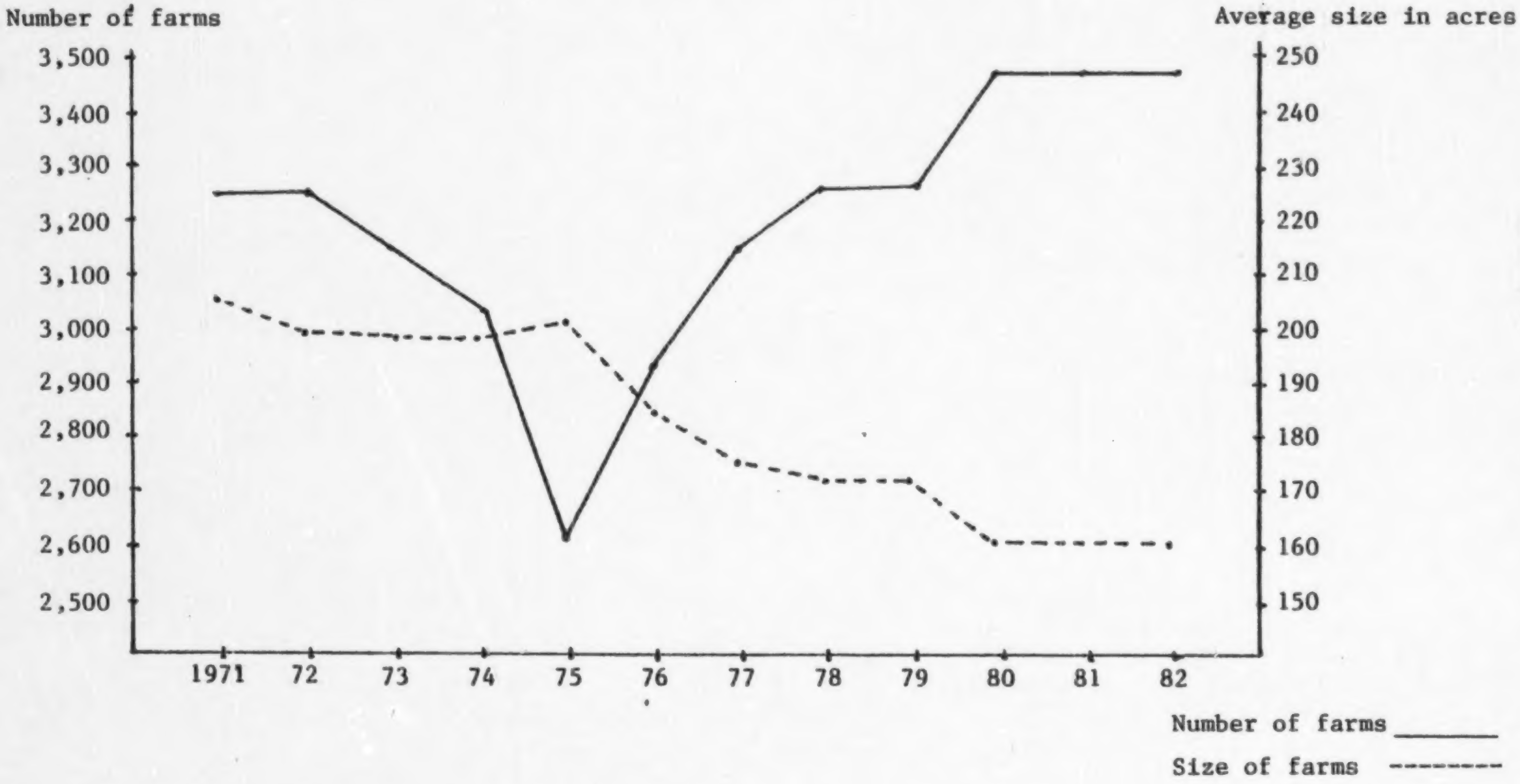
As the population grew and New Hampshire changed from an agricultural state to an industry and tourist state, cropland was lost through reafforestation and development. It is estimated that between 1949 and 1974, New Hampshire lost 68.5 percent of its farmland and 61.4 percent of its total cropland.[10] The years between 1964 and 1974 showed a 40.2 percent drop in farmland; and another 11.2 percent was lost between 1969 and 1974.[11] Certain areas of the state lost more farmland than others. During the 1950's when the greatest land use changes occurred, 8 percent of the total land in agriculture was developed while 18 percent became idle, or began the process of reafforestation and can potentially be returned to agricultural purposes.[12] Carroll County and the Connecticut River counties of Cheshire, Coos, Grafton and Sullivan lost less than 7 percent of the Best to Good agricultural land to development, whereas Hillsborough and Rockingham lost 16-19 percent.[13] Total developed land in the 1970's was two and a half times that of the 1950's and now represents about 4 percent of the total state.[14]

Figure 2, "Farm Number vs. Farm Size, New Hampshire, 1971-1982," shows that as average farm size has decreased, the number of farms has increased. Contrary to national trends, the trend in New Hampshire is toward a greater number of smaller farms. A recent USDA report concluded that the number of small farms in the northeast region will continue to increase by about 8 to 10 percent through 1990.[15]

Soil surveys of New Hampshire show that there is a large amount of prime farmland in all areas except for the far north and the White Mountain areas. These farmland soils are capable of producing a variety of crops including corn, vegetables, small fruits, hay and pasture, alfalfa, and tree fruits. Intensive management practices would make these soils even more productive than usual management practices.[16]

Generally speaking, soil erosion does not seem to be a great problem in New Hampshire, although certain areas, especially on the prime lands on river floodplains, continue to require careful management. Current erosion rates on New Hampshire cropland are estimated to be 3.5 tons of topsoil moved (but not necessarily lost) per acre per year; the acceptable rate is 5 tons per acre per year.[17]

Figure 2 Farm Number vs. Farm Size, New Hampshire, 1971 - 1982



Source: New England Crop and Livestock Reporting Service

Farming Expenses

It is not easy to make a living farming in New Hampshire; it is even harder to get started in farming. The obstacles and barriers in farming include the high costs of land, equipment, fuel and fertilizers, high taxes, and a marketing system that favors the large distant producer over the smaller local producer. As of January 1, 1982, the total New Hampshire farm debt, including farm households, was 88.7 million dollars, which represents 91 percent of the total cash receipts from farm marketings in 1981. In other words, New Hampshire farmers owe almost as much as their total gross income. Sixty three percent of the total debt is real estate debt; 36 percent is non real estate debt, excluding CCC.[18] In 1979, the most recent year for which complete statistics are available, the gross farm income in New Hampshire was 114.9 million dollars. Production expenses, including feed, livestock, seed, fertilizer and lime, repairs and operation of equipment, hired labor, depreciation, taxes, interest on debts, and rented land, totalled 104.8 million dollars, 91 percent of the gross income. The average net farm income in 1979 was $3,687.[19] Among the most expensive production costs are feed, fertilizer and chemicals, fuel and taxes. In 1979 the average New Hampshire farmer paid out $7795 for feed, $4207 for fertilizer, lime and other agricultural chemicals, and $2914 for fuels and energy.[20] That farmer also paid $8.48 per acre in taxes, which is a 142 percent increase since 1967.[21]

As long as we produce the foods we produce using the techniques and energy we use, we will continue to be heavily dependent on outside inputs of feed, fuel, and fertilizer and other chemicals. We will need radical changes in our production systems and consumption patterns to reduce these dependencies. We can, however, alleviate some of the burden on farmers of the cost of production by restructuring our tax system so that farmers pay a smaller share of state taxes.

Energy

The world energy situation and the subsequent increase in energy prices have drawn virtually everyone's attention to the problem of energy. New England derives most of its energy from oil; oil prices are substantially higher (approximately 17 percent) in New England than other parts of the country since we are at the end of the energy supply-line. A significant portion of our energy dollars go to agricultural production and transportation in New Hampshire.

This century has brought mechanization to New Hampshire agriculture; instead of relying primarily on human and animal labor, we now rely on nonrenewable fuels such as gasoline, diesel fuel, bottled gas, fuel oil, and electricity to power our machinery, heat and light our barns, transport and cool our products, and handle feed and wastes. In 1978 New Hamsphire used a total of 1080 billion BTUs in agriculture;

846 billion BTUs were used to produce and transport crops, and 234 billion BTUs were used in raising and transporting livestock.[22] This includes the energy required to manufacture fertilizers and pesticides; the manufacture of these chemicals accounts for 32 percent of the total, or 347 billion BTUs.[23] In 1978 New Hampshire used 3,202,000 gallons of fuel oil, 342,000 gallons of bottled gas and 18 million kilowatt hours of electricity.[24]

The greater costs of these fuels in New Hampshire increases the cost of food production within the state, making it harder for in-state producers to compete with out-of-state producers. A large percentage of these energy costs are for transporting products. By restructuring the marketing system so that it is based on local production and local consumption, we can alleviate some of these costs.

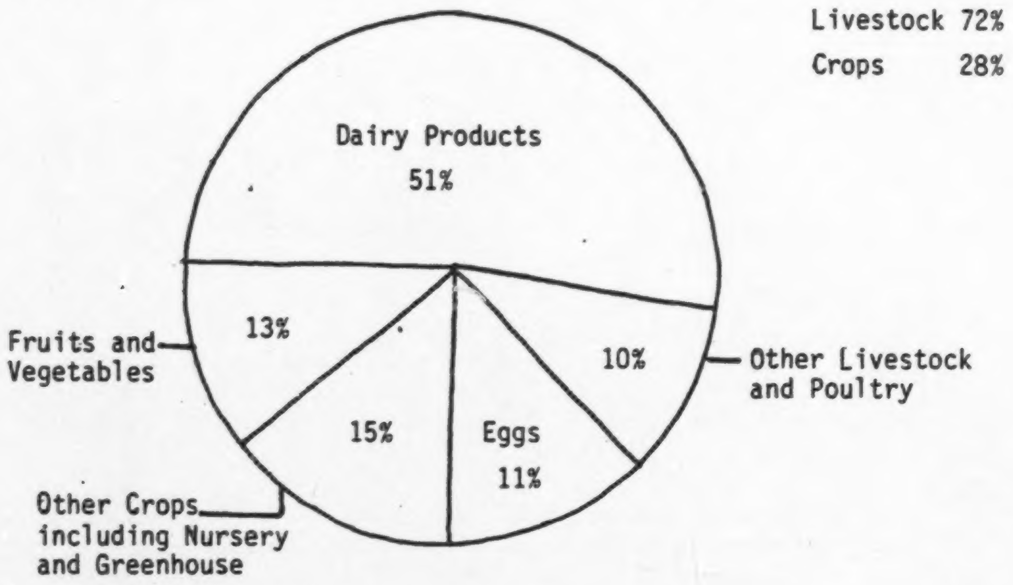
Since 32 percent of the energy used in New Hampshire goes to producing chemical fertilizers and pesticides, we could cut agricultural energy bills by converting to organic farming methods. In 1981, New Hampshire farmers used 24,650 tons of fertilizers, which are becoming very expensive as energy costs rise.[25] Organic methods which would eliminate or at least greatly reduce chemical fertilizer and pesticide applications include crop rotation with legumes, green manuring, and sheet composting for building natural soil fertility, and using integrated pest management (IPM), intercropping, crop rotations, and diversified production for natural pest and disease control.

New Hampshire farmers are moving slowly toward these methods. Fertilizer use is diminishing a few percentage points each year (1981 use was 93 percent of 1979 use[26]), although this may just be a result of lower production. Most of the manure from New Hampshire livestock is returned to fields. The extension service and the conservation service have implemented outreach and educational programs to develop the use of minimum tillage and IPM techniques on New Hampshire farms. Farmers have shown a great deal of interest in learning about minimum tillage; a limitation now is lack of available appropriate equipment. Alan Eaton, the IPM coordinator at UNH, reports that the extension IPM program has thus far been a success. Outreach is conducted through a weekly newsletter, "New Hampshire Insect Notes," and a Code-a-Phone for fruit pest updates. IPM plots of fruits and vegetables have proven very successful. Conventional apple orchards had nearly twice as many fruits with insect or disease injury as the IPM plots.[27] The costs of implementing IPM techniques were lower than the usual chemical methods of pest management. Similar successes in lower costs and comparable or higher quality produce were made in blueberries, potatoes, and sweet corn.

Agricultural Industries

Although New Hampshire is no longer an "agricultural" state, agriculture is still an economically important industry in the state. In 1981, the total cash receipts from farm marketings were $97,216,000.[28] This is up slightly from 1979. Figure 3 shows how much of the total cash receipts each industry represents.

Figure 3



a. Dairy and Beef

Dairying is the largest segment of New Hampshire agriculture; beef production is inextricably intertwined with the production of milk. The number of beef cattle in New Hampshire is less than one tenth of the number of dairy cattle, however. Between 1969 and 1973 New Hampshire lost an average of 52 dairy farms per year. The total number of herds and the total number of cows declined while average herd size increased; it was the farmer with the smaller herd who was squeezed out during this time.[29]

Although all feed grain is imported into New Hampshire, dairying and beef production are still vertically integrated on New Hampshire farms. This means that except for grain, all feed including pasture and forage is raised on the farm where it is fed to the livestock.

An important by-product of the livestock industry is manure. Of the 595,000 tons of manure produced yearly, 500,000 are returned to the soil.[30]

Of the milk produced in New Hampshire, a small percentage is fed to calves, and a small percentage is marketed directly. Ninety-four percent is converted to beverage milk, while about 6 percent is converted to frozen dairy products and frozen dairy mixes. Virtually no New Hampshire milk goes into producing butter or cheese.[31] Since there are no milk processing plants in New Hampshire, all raw milk is trucked out of state and equivalent milk is brought in wholesale to supply wholesale and retail channels in New Hampshire.

There are not nearly enough meat animals raised in New Hampshire to fill the capacity of in-state slaughter and packing houses. Almost 83 million pounds of dressed weight meat are processed in New Hampshire; almost 50 million pounds are shipped out of state. About half of the rest is sold to hotels, restaurants, and other institutions; the balance of 17 million pounds moves through regular marketing channels.[32]

According to "Resources and Technology on New Hampshire Dairy Farms," by R. A. Andrews and T. C. Stein, the current use valuation tax program, which taxes agricultural land at a lower rate than residential and commercial land, will play an important part in dairy prospects, since taxes are a significant portion of production costs. In 1976, Fifty five percent of the 256 dairymen in New Hampshire were involved in this program.[33]

The current structure of the dairy and beef industry clearly points to several ways in which we could make our food system more stable. It is encouraging that by and large dairying is a vertically integrated production industry, thus it would be easier to convert from regional production and marketing to localized production and marketing. A young farming couple in Greenville, New Hampshire, provides an example of this and shows us that there is a great potential in local production, processing and marketing. This couple has recently started to produce semi-hard cheese, produced from milk from their small herd, for local sale. Their operation has thus far been successful; they are currently considering increasing their production.[34] It is clear that to stabilize the dairy portion of our food system we need small local processing plants so that milk can be marketed and consumed close to where and when it is produced. And since dairying and meat production are dependent on grain imports, we might look into the possibilities of growing our own feed grains, developing an appropriate feed grain substitute (for example, certain trees, including locusts, chestnuts, oaks, beech, etc. produce nuts and seeds that potentially can be developed into stock feed and can be grown on hilly land not suitable for other crops), and finding production methods which aren't based on grain feeding and fattening. The latter is particularly applicable to beef production; although it takes longer and produces a product slightly different in taste and texture, beef cattle can be raised on grass and forage without grain, providing the leaner beef many consumers today are demanding.

b. Pork and Lamb

Although sheep raising is still a small part of New Hampshire's agriculture, it is a stable segment. This stability is probably due to the fact that there are a large number of small herds; this represents many part-time and home-production operations. Two thirds of the annual lamb crop is custom slaughtered. Approximately 60 percent of the lamb crop is exported hothouse or Easter lamb, which commands a high price at the market.[35]

Pork production has declined steadily in New Hampshire. Virtually all the pork produced is for home consumption; 90 percent is custom slaughtered. One third of the annual production of pigs is exported as feeders or replacements and the remaining two thirds are raised locally for home slaughter.[36]

For both sheep and swine raising, feed costs and payments to meat processors are significant. However, "...both of these animal enterprises make moderate contributions to the New Hampshire market economy but make substantial contributions to the welfare of individual consumers either in reducing the cost of their food or in improving the quality of their diet."[37]

c. Poultry and Eggs

At one time the poultry and egg industries were very important to New Hampshire agriculture. "Prior to 1955, the New Hampshire broiler and egg industries were growth industries. The broiler industry peaked in 1956, egg production in 1964, after which the industries entered periods of decline. By 1973, broiler production had declined to a negligible amount and the egg industry tended toward stabilization."[38] These industries declined in a large part due to modernization of production technologies and shifts in the market structure which favored the larger and more specialized operations in other parts of the country over the smaller New Hampshire producers.[39] Since 1950, egg production and the number of layers has dropped 60-70 percent. In 1980, several large laying operations went bankrupt, two expanded and one shifted to a breeder operation. The net change in the number of birds was a 34 percent reduction in the number of layers, a 16 percent decrease in the number of pullets, and a 12 percent increase in the number of breeders.[40] Fifty-seven percent of the eggs produced in New Hampshire are sold wholesale; 40 percent are sold to stores and restaurants.[41]

Although virtually all poultry feed grain is imported, New Hampshire has demonstrated that it can produce chickens and eggs. Changes in the marketing structure which would favor smaller local producers and local marketing and distribution of chicken and eggs might stimulate the poultry industry and make our supplies more stable.

d. Fruits and Vegetables

Fruit and vegetable production in New Hampshire is generally governed by what one extension agent called an "underground economy." Since it is difficult for the small New Hampshire grower to successfully compete in the commercial wholesale marketing structure, much of what is grown is for direct marketing and home consumption. New Hampshire has the potential to grow much more of its fruits and vegetables; it is the restrictions of the commercial marketing system and the limitations of current direct marketing channels which, to a large degree, cause this under-production in New Hampshire. The UNH report, "Marketing Agricultural Products in New Hampshire: VII. Vegetable Market Structure and Expansion Potential" by Andrews, Leighton and Latremore, shows that in 1977 an estimated 1100 acres were readily available for vegetable production.[42] Under intensive management, this land could produce an enormous amount of fresh fruits and vegetables; smaller plots of land can be utilized in home gardening, producing even more fruits and vegetables.

In 1981, the New Hampshire Department of Agriculture reported that the New Hampshire vegetable industry represented a $10 million value and that 4600 acres were in commercial production.[43] This represents about 5.5 percent of the total agricultural cash receipts paid to farmers.[44] Vegetable production is increasing slowly, except for potato production, which has decreased rapidly in the past 15 years.[45]

There is a steady increase in soft fruit production as well, such as strawberries, blueberries and raspberries. Soft fruit production is valued at $3.5 million. However, New Hampshire's main fruit production is apples. The 5000 acres of New Hampshire apple orchards, mostly MacIntosh, produced 1.5 million bushels of apples in 1980, valued at $11 million.[46] Apples represent 7.6 percent of our agricultural economy in terms of growers' cash receipts.[47] Nursery and greenhouse products are another very important agricultural industry; in 1979 these represented 9.4 percent of the total cash receipts.[48]

Although it is extremely difficult to estimate the amount of fruits and vegetables produced in home gardens in New Hampshire, the results of the recent national Gardens for All survey can give us an estimate based on averages from the East. According to this survey, 41 percent of the people in the East garden; the median garden size is 660 square feet, and produces 545 lbs. of food per season. According to these averages, New hampshire residents cultivate 249,117,000 square feet of gardens and produce 205,710,250 pounds of fresh fruits and vegetables.[49]

New Hampshire is seriously hampered by a lack of produce processing plants and storage facilities. It is estimated that New Hampshire has only a 5-10 day reserve of food; if we suffered an oil embargo or and across-the-board truckers' strike, cutting off supplies, retail stores would run out of food after about a week.[50] New Hampshire has only two food processing plants other than fish processing and packaging plants, and has no large storage facilities. In order to develop any kind of food self-reliance we need plants to process and package our commercially produced fruits and vegetables, and we need facilities for storing large amounts of storable fresh vegetables such as potatoes, onions, beets, squash, and cabbage. We also need to make greater use of the home storage techniques such as root-cellaring, canning, and freezing in order to preserve the harvests of our home gardens.

e. Fisheries

New Hampshire fishermen make good use of the 17 miles of New Hampshire coastline. In 1981 New Hampshire fisheries harvested 6,693,515 pounds of fish, a $2,329,000 value, of cod, pollock, haddock, flounder and scallops.[51] Commercial operations and individuals trapped 691,667 pounds of lobster.[52] The 16 processing and wholesale plants in New Hampshire provide year-round employment for 477 people.[53]

Conclusion

New Hampshire currently produces small quantities of many of the foods we consume, and the potential to expand this production exists. In order to develop a more stable and sustainable food system, we need to alter our current methods of production and distribution. We must learn to use our resources to everyone's advantage. We need to strengthen direct marketing channels that best serve New Hampshire's growing number of small farms. We should grow more food at home, and learn how to keep the harvest through the winter. We need to limit our use of expensive, imported energy. Many people in New Hampshire have already started work in these areas. By joining and supporting them, we are assuring ourselves of a stable, sustainable, and vital food system.

Direct Marketing of Produce in New Hampshire

One of the most important ways New Hampshire could be more self-reliant in food is by producing more of our own produce and supplying our own markets. One of the biggest ways to encourage greater production of fruits and vegetables is to favor the small-scale New Hampshire grower by increasing and strengthening direct marketing channels. Although at this point the expansion of large-scale vegetable production in New Hampshire is limited by available cropland,[54] there is a great potential for small-scale, part-time growers _if_ markets exist in which they can get a fair price for their produce.

Although the structure of the produce marketing system in New England is slowly changing, it still very much favors the large-scale growers of the South and Southwest over the smaller, seasonal regional growers. The center of distribution for produce in New England is the Boston Terminal Market in Chelsea, Massachusetts. To this market come trucks and railcars of produce from California, Florida, Idaho, Oregon, the Carolinas, Mexico, New Mexico, Texas, etc. The produce which goes through Chelsea market is mostly from large commercial operations, and market brokers prefer purchasing from these operations because of better prices, uniform quality, and scheduled deliveries.[55] In this system, based on regular large volumes handled by a few operators, small producers have a very difficult time competing. Since buyers need a year-round supply of most commodities and out-of-state producers need year-round markets, brokers and large-scale producers are almost inextricably linked in the national and international production networks. Growers from New England, all of whom are small-scale compared to southern and western growers, usually have produce to sell only at certain times in the season. By bringing in-season produce to the market, they create a glut; it becomes a buyer's market, prices are depressed and the small producer is hardest hit. Many small producers are also unaware of or not able to meet the quality standards of packing, grading, washing, and cooling required by the buyer, which puts them at a further disadvantage.[56]

Small producers across the nation have always complained of a lack of access to markets. This lack of access effectively bars small producers from significantly contributing to the national food supply. "Small growers could supply a large part of the fruit and vegetable requirements when in season. This is particularly true for fruits and vegetables that require hand harvesting,"[57] concludes the TVA report, "Marketing Alternatives for Small Farmers." It is clear that small producers cannot as individuals effectively compete within the national marketing networks. As the TVA report states, "...we are in the midst of a realignment of traditional marketing channels that will result in a significant difference in the way food is distributed... food retailing is experiencing an upheaval. Some supermarkets are profitable, but others are bankrupt... the fast food houses and conventional restaurants have enjoyed great successes in the past decade, but their expansion seems to be slackening... This is the environment direct marketers find themselves in today... the potential for a significant and profitable share in the food markets."[58] Certainly facilitating direct producer-consumer links will be beneficial to both parties. Consumers would pay lower prices while farmers would receive a higher price per pound for their produce, since distribution and transportation costs are effectively eliminated. Produce would be fresher, and farmers would have direct contact with consumers, and therefore have a better idea of consumers' needs.

Implementing direct marketing channels in New Hampshire has been harder than expected. It is not easy to compete with the existing market networks, which are well established. Nor is it easy to coordinate growers to produce uniformly packed, graded, washed, and precooled fruits and vegetables. Most importantly, it is hard to reeducate consumers who for years have been used to perfect, uniform produce, and a large selection of varieties, no matter the season. It is consumers' demands for the entire range of produce items year-round which necessitate out-of-state control of New England markets and essentially keep local growers from competing.

Direct marketing alternatives can be divided into two groups: wholesale market alternatives and direct farm-to-consumer alternatives. Wholesale alternatives include pooling arrangements such as growers' cooperatives, and store-to-door sales where farmers sell directly to retail stores. Direct farm-to-consumer alternatives include roadside stands, pick-your-own operations, and farmers' markets.

The direct marketing method that probably shows the most potential for big success and yet has proved the most problematic is producer coops. Problems include a lack of sufficient start-up funds, problems in management and access to appropriated markets. Also, growers often are unwilling to completely relinquish their rights to bargain as individuals for the good of the coop. New Hampshire has one operating coop, the Merrimack Growers Coop in Concord, and one coop in the initial organizational phase, the Seacoast Growers Association, in Stratham.

Store-to-door sales are a possible market open to New Hampshire growers. A study by the Connecticut River Valley Agricultural Project, a cooperative project of New Hampshire and Vermont's Department of Agriculture and State Planning Offices, showed that most retail groceries in that area are buying some produce from local growers.[59] Selling produce through a roadside stand has been a traditional market for New England growers, and roadside stand sales have risen in the past few years.[60] Pick-your-own operations, producing items which require frequent hand-picking such as berries, apples, grapes, peas, beans, and sweet corn, etc. have also enjoyed growing successes.

Farmers' markets are staging a comeback in New Hampshire. In 1981 there were 15 farmers' markets, in 1982 there were 20. Although farmers' markets are time-consuming for growers, the prices they receive for their fruits and vegetables are usually high enough to make it worthwhile.

Direct marketing outlets can be greatly aided by state and local support, but it is the producers and the consumers who ultimately must develop this new marketing system. Producers need to work together for a common goal rather than try to make it as individuals. There needs to be more cooperation among producers in growers' coops and in farmers' markets. They need to be more aware of consumers' needs and also of buyers' needs in grading, packaging, washing and cooling, and be willing to respond to these needs. Consumers, including buyers in restaurants, hotels and institutions, need to make a real effort to support direct marketing outlets by buying and eating much more locally grown produce. They should eat more seasonally, not demanding lettuce and fresh tomatoes in January, and buying produce during the harvest-time and canning, freezing, and root-cellaring as much as possible.

What's Being Done

The state of the New Hampshire food system has been a concern of consumers, farmers, food wholesalers and retailers, state and university officials, and concerned citizens for a number of years. In May, 1979, Maynard Heckel, director of the Cooperative Extension Service at UNH, wrote, "There is a quiet, but widespread, concern among the citizens of our state about the future availability of food at a price we can afford to pay, and at a price that is adequate to assure producers a fair return on their investment. This concern started to gain momentum in 1973 with the oil embargo and has increased with severe weather conditions, increased cost for fuel to transport food into the state and the shift in the use of good farmland from food production to other uses."[61] Citizens have not only voiced their concerns, they have begun to organize and work to change the present situation. Not only are state and university officials supporting local agriculture and food self-reliance in their work, but consumers and producers are working together to open direct marketing channels, educate the public, lobby state government, and learn more about ways to strengthen the food system. These efforts are slowly being rewarded; people are beginning to take responsibility for their own food, more and more people are getting started in food production, whether on a full or part-time farming or a gardening scale, and are finding the resources available to help them. People are beginning to give support to local producers, buying more food from roadside stands, and farmers' markets. And people are taking the responsibilty to educate themselves about their food system and food-related issues. There remains much to do, but we have made an honest beginning.

Although many are disappointed at the lack of support shown by the state legislature (e.g. the Sunset Review report which recommends abolishing the New Hampshire Department of Agriculture,[62]) and the lack of follow-up funds for the successful Purchasing Development Rights Act,(an act which allows the state to help protect our dwindling farmland acreage[63]) state offices and state and university programs have lately emphasized and supported local agriculture and stabilizing the New Hampshire food system. The New Hampshire Department of Agriculture, aside from their information-gathering and organizational work, has done a great deal of work promoting local agriculture. Through their "Nature-ly New Hampshire" campaign and their support of efforts in direct marketing, they have worked to educate consumers and producers about the economic, ecologic, and health benefits of strong local agriculture. The Department of Agriculture is currently under seige in the wake of the Sunset Report recommendations; it would be extremely unfortunate if current economic hardships within the state government were dealt with by eliminating or reducing this most necessary and beneficial state department.

The various agricultural groups in and around Durham, New Hampshire, UNH, Soil Conservation Service, Cooperative Extension Service, and the Department of Agriculture, all emphasize the development of a sustainable local food system and careful conservation of available resources. A number of UNH students have researched ways to make New Hampshire more self-reliant, and UNH regularly publishes reports on such helpful topics as direct marketing, the structure of different agricultural industries, land use patterns, soil surveys, etc. in their efforts to gather and organize basic information on New Hampshire agriculture. The New Hampshire Cooperative Extension Service recently published a booklet for the public, "And When We Went There The Cupboard Was...Bare," which outlines the instabilities of the New Hampshire food system and suggests ways in which people can help in the development of a stable system. The Extension Service also has a great deal of contact with New Hampshire producers, and helps them obtain the information and technical assistance they need.

There are a number of state and local citizens' organizations in New Hampshire whose goals are to help develop a sustainable food system. This may be through education of each other and the public, developing and sharing practical skills, establishing growers' coops or farmers' markets, lobbying the state legislature, etc. Although it is impossible to mention them all, a few are most noteworthy.

The Natural Organic Farmers Association (NOFA) which began in 1971 from a meeting of growers in Vermont interested in finding ways to market organic produce, has become "...a focus for farmers and non-farmers alike who believe that environmental health, viable communities, meaningful work, and a sound local economic base can flourish with the development of a diversified regional agriculture which works within the natural rhythms of the Earth."[64] Until last year NOFA was split into two cooperating chapters, New Hampshire and Vermont; recently chapters have formed in other northeastern states. NOFA supports small-scale and organic farming through its newsletter, The Natural Farmer, workshops, apprenticeships, seminars, on-farm research, and its very popular annual conference. Many first-time farmers and gardeners in New Hampshire gained the knowledge and skills necessary to grow food from NOFA. NOFA provides support for people who are continuing their efforts to develop local sustainable agriculture.

NOFA has also supported the development of direct marketing channels. In 1979, the New Hampshire NOFA chapter organized the Central New Hampshire Agricultural Marketing Project in Concord, specifically for that purpose.[65] The primary goal of CNHAMP is to establish local marketing structures for central New Hampshire farmers. Thus far, CNHAMP has organized the Concord Farmers' Market, and the Merrimack Growers Coop, the first vegetable coop in New Hampshire (the Seacoast Growers Association in Stratham, New Hampshire, is in its organizational phase). Current CNHAMP projects include establishing the Mobile Farmers'

Market, which travels to low-income and elderly housing projects, organizing a federation of New Hampshire farmers' markets, and developing local markets for storage crops.

The Rural Education Center (TREC), in Wilton, directed by Samuel Kaymen, is an educational center dedicated to the development of sustainable agriculture and a stable food system. "The goal of the Rural Education Center is the development of a land-based culture in which people, communities, and regions are self-sufficient in food, fiber and fuel. Focusing on New England, TREC provides an opportunity for people to acquire practical training and experience in rural skills as well as knowledge of the principles necessary for the creation of a sustainable agriculture. The Center's programs promote self-reliant living, cooperative work styles, careful use of the land, and management of local resources to meet the basic human needs of the region."[66] The center is currently involved in establishing a yogurt factory, as an example of ways that farmers can diversify, process and market their own products locally.

Recently a group has formed in the Dover area called the Friends of Agriculture. This group is working to support agriculture in their area by supporting the Rochester and Dover farmers' markets, conducting an agricultural inventory of Dover, developing a local promotional campaign, including a series of newspaper articles and radio programs on agriculture, and continuing their coordination of bulk fruit tree orders. [67]

The New Hampshire Farm Bureau, an older organization of established farmers, shows its support by carrying on the often difficult job of lobbying the state legislature and keeping tabs on its actions. The Farm Bureau also coordinated direct-marketing of food within its member group.[68]

Four years ago a coalition of 17 organizations, including representatives from citizens groups, state offices, the university, state legislature, extension service, businesses, etc, met and discussed issues surrounding the security of the New Hampshire food system. The outcome of this meeting was a booklet, "Recommendations for a New Hampshire Food Policy,"[69] which documented the long-range goals in consumer needs, land use, agricultural production, marketing, transportation, and food storage and processing, developed by the group. These recommendations are still very sound; this document is probably the most important step towards food self-reliance yet taken in New Hampshire. The ground is broken; we now know what we need to do to develop a stable food system, and we even know much about ways to do it. Our task at this point is applying our knowledge and experience. Many people have begun, but ultimately everyone will need to get involved.

RECOMMENDATIONS

When the New Hampshire Food Policy Study Committee met four years ago, they developed specific recommendations based on the input from representatives of all areas of the New Hampshire food and agriculture system. These recommendations are still very appropriate and comprehensive. Therefore, instead of reproducing a new set of recommendations, I have used their recommendations as found in "Recommendations for a New Hampshire Food Policy" as the core of my recommendations. I have updated a few recommendations, added words here and there, and added points of my own. Any changes or additions I have made are in parentheses.

The immediate goal of the Policy Committee was to form recommendations as a foundation for a comprehensive food policy. To instate this policy and make it effective, concluded the committee, is the challenge which faces New Hampshire residents today; this is especially true in the wake of state and local governmental budget cuts,which have reduced the capacities of many government offices. "A decision should be made on a state food policy. In order to accurately reflect the needs and goals of New Hampshire's citizens, this decision must be made by people themselves based on an informed study of each element of the question. The report of the New Hampshire Food Policy Study Committee, "Recommendations for a New Hampshire Food Policy", should serve as the source of the decision as to whether or not to implement a comprehensive food policy. The ultimate decision rests with New Hampshire's people."70

CONSUMER NEEDS (AND RESPONSIBILITIES)

GOAL: Assure an adequate, wholesome food supply, emphasizing locally-grown, (organic, seasonal), foods at reasonable cost.

Develop a level of public knowledge and understanding of foods (and the food system) and nutrition which will promote optimal nutrition, health, well being (and responsible consumer actions).

Objective 1: Coordinate state nutrition education and food assistance efforts to maximize their effects.

Recommend that:

a. The agencies involved in nutrition and food assistance coordinate their activities toward the stated goal.

b. The following subjects be added to nutrition education programs in addition to traditional subject matter:

* the contribution of locally-available, (seasonal, organic), locally produced and processed foods to the diet.

* the relationship between nutrition and health.

* methods of food purchasing, preparation, preservation, and storage to maximize nutritional value and minimize waste.

* the role (and responsibilities) of the consumer in the food system (e.g. the importance of consumer demands and buying practices in determining the structure of the marketing system and hence, where our food comes from, and e.g. the health and ecologic effects of over-consumption of grain-fed meats).

Objective 2: Provide teachers and food service workers with accurate nutrition information.

Recommend that:

a) Health education, including nutrition, be part of teacher educational programs.

Objective 3: Integrate nutrition education into the Food Stamp Program.

Recommend that:

a) State agencies with expertise in nutrition assist the Food Stamp Program in nutrition education.

Objective 4: Strengthen and maintain the systems for food quality and safety control.

Recommend that:

a. Safety and quality inspection systems expand to meet the increase in local food production and processing.

b. Food safety inspections of public food service establishments be increased.

c. Workers in food service establishments and institutions obtain training in safe food production and serving practices.

d. Food service establishments make available information on the identity of, and the ingredients in, foods which they serve.

e. The need for labeling regulations be examined as food processing and production increases in New Hampshire.

Objective 5: Encourage the growth and development of a coordinated consumer food cooperative system.

Recommend that:

a. Leadership be provided by the New Hampshire Department of Agriculture (and outside assistance be sought from organizations such as the New England Federation of Food Coops).

b. The University of New Hampshire Cooperative Extension Service assist in providing information and training for consumer food cooperatives.

Objective 6: Gather information on the nutritional status and food consumption patterns of the population of New Hampshire (so we don't need to rely on national per capita averages, which may not represent what is consumed in New Hampshire.)

Recommend that:

a. The Division of Public Health Services of the New Hampshire Department of Health and Welfare conduct regular data collections (with the cooperative help of consumers).

Objective 7: Provide information on the nutritional contribution of locally-available (organic, in-season) produced and processed foods.

a. The New Hampshire Agricultural Experiment Station develop and coordinate research (and that the extension service makes this information available).

(Objective 8: Provide information to consumers about what they can do, how they can organize and work to support local agriculture and a stable food system).

LAND USE

GOAL: Preserve land that is presently in agriculture.
Expand agriculture to land capable of production.

Objective 1: Encourage and assist private development and all levels of government to utilize soils (and sites) poorly suited to agriculture.

Recommend that:

a. The Offices of State Planning and Regional Planning, with the assistance of agencies such as the Soil Conservation Service, the Conservation Districts, the Cooperative Extension Service, and others, research and develop an educational package which will provide communities with guidelines on needed land treatment to assist building on soils (and sites) poorly suited to agriculture.

Objective 2: Encourage publicly-owned lands suitable for food production to be made available for commercial, small and part-time farming and for community gardening (and community orcharding).

Recommend that:

a. Conservation Commissions in each community assess the agricultural potential of the publicly-owned lands within their jurisdiction and publicize their availability, (and the community residents organize and determine the most feasible ways to put that land into production).

Objective 3: Compensate landowners who voluntarily choose to protect agricultural lands permanently.

Recommend that:

a. Support be given to the passage of the Agricultural Encouragement and Lands Preservation Act (Revitalization of the PDR Act) and the continuation of the Current Land Use Assessment Act.

Objective 4: Encourage the revision of zoning ordinances to allow agricultural uses in residential areas.

Recommend that:

a. The Offices of State Planning and Regional Planning develop and promote systems which will encourage agricultural production in residential, industrial, and business areas in communities of the state.

Objective 5: Encourage good conservation practices on all agricultural land to ensure long-term productivity.

Recommend that:

a. Through the joint action of the Soil Conservation Service, Agricultural Stabilization and Conservation Service, The University of New Hampshire, and the Conservation Districts, an integrated program be developed that will help to:

- Conserve the agricultural soils of New Hampshire.
- Develop practices that improve the productive capacity of agricultural soils.
- (Encourage no-tillage practices in New Hampshire through education and assure an adequate supply of no-till equipment, which is a current limitation.)

Objective 6: Develop and encourage ways in which we could produce the most from our farmland without diminishing its quality, e.g.:

a. Encourage the production of high-yielding and highly nutritious foods, e.g. using our cropland to grow soybeans rather than for livestock silage.

b. Develop and encourage the use of intensive horticultural techniques which are more labor-intensive but give much greater yields than conventional techniques.

(c. Develop alternative food sources which are indigenous to New England or fit into the New England ecosystem, e.g. wild foods, developing treecrops suitable for human consumption or livestock feed, to make the most of our hilly lands.)

AGRICULTURAL PRODUCTION

GOAL: (Continued recognition that)... agriculture is an important industry in the balanced growth of New Hampshire.

Maximize New Hampshire's commercial food production and encourage small and part-time (and diversified) farming and home food production toward family and community self-sufficiency.

Objective 1: Increase production by commercial farmers so that, as the opportunities arise for the New Hampshire producer to compete, the resources will be available to meet the demands.

Recommend that:

a. The State Department of Agriculture, University, and farm related groups work with the suppliers of production inputs so that there will be an improvement in the timeliness, selection, and price of these supplies and services.

Objective 2: Promote home food production so that those with the potential to produce food on their own property will be able to provide a portion of their food needs.

Recommend that:

a. Educational programs of the University of New Hampshire Extension Service be directed more vigorously to the home food producer and the suppliers of their production inputs, and home garden supply businesses be further encouraged to help the home producers by providing production information and other services.

Objective 3: Promote research on agricultural production methods which are less dependent on petroleum-based products (including the development and establishment of new cultivars which require fewer energy inputs, such as perennial crops and food producing trees.)

Recommend that:

a. The Cooperative Extension Service, Agricultural Stabilization and Conservation Service, Soil Conservation Service, and Conservation Districts encourage farmers to make the best use of manure and other organic waste and composting to improve the productivity of soils and to reduce production costs. Further application should be made in the use of community organic wastes such as sewage sludge, leaves, brush, and garbage, so that this soil conditioning is safe and economical and is applied to the soil using proper techniques.[71] (Encourage the use of other organic techniques of food production, such as the use of IPM rather than chemical pesticides).

Objective 4: Encourage the increased productivity of the small and part-time farmer and identify the ways these farmers can play an increasing role in food production.

Recommend that:

a. Increased attention be given to the needs of new farmers, whether large or small, and the special needs of the small and part-time producer by agricultural agencies at the state and federal level and by farm organizations in the areas of production, land use, marketing, and business (and resource) management. (Work to eliminate or reduce the high start-up costs for beginning farmers.)

(Objective 5: Encourage agricultural production by developing ways in which farmers can process and market their products locally, such as local cheese and yogurt production.)

(Objective 6: Encourage production by encouraging diversification; diversified production is much more efficient in terms of natural resources, and is both economically and ecologically more stable.)

FOOD PROCESSING AND STORAGE

GOAL: Have processing and storage facilities and services which will adequately serve the needs of New Hampshire's farmers, and have storage facilities which ensure an adequate supply of food for New Hampshire throughout the year.

Objective 1: Create a food processing industry in New Hampshire which meets the needs of producers and consumers within the local economy and complements the industrial growth of the state.

Recommend that:

a. Private industry and public institutions encourage the development of processing and storage facilities for all commodity areas; that consumers and food industry be encouraged to accept minimum processing, including packaging, which should reduce energy consumption and food costs and retain the inherent value of food; and energy-efficient facilities and methods for processing and storing of New Hampshire-grown and consumed products be researched.

Objective 2: Expand livestock slaughtering and storage facilities in proportion to an increased production (not clear if this is necessary).

Recommend that:

a. State inspection criteria for slaughtering and meat and poultry processing be established within the State Department of Agriculture.

Objective 3: Fund and administer a pilot project for food processing to serve institutional needs and evaluate the transferability of this concept for application throughout the state (The Concord public school system's efforts to store locally grown winter vegetables for school lunches can serve as a similar kind of pilot project).

Recommend that:

a. Community and home processing and storage facilitites for the use of the family and commercial producer be established so that economies in equipment and energy consumption can be realized (this is an area in which citizen organizations can be extremely effective).

(Objective 4: Encourage small local food processing and storage whenever possible, without sacrificing health and safety standards. Disseminate information on freezing, canning, root cellaring produce, processing and storing dairy products, home butchering and storage of meats, emphasizing safe and healthy methods.)

TRANSPORTATION

GOAL: Provide efficient transportation of food and feed products from producer to consumer in a timely manner.

Objective 1: Maintain and repair bridges and roads of the state highway system for transport of agricultural products to and from the farm. Encourage State Public Works and Highway municipalities to inspect, repair, and adequately maintain bridges and construct and maintain rural roads over state highways.

Recommend that:

a. The New England Governors convene a meeting of the various highway departments toward establishing uniform trucking regulations throughout the six-state region.

Objective 3: Correct the inequity of freight rates between the Northeast and the South.

Recommend that:

a. Our Congressional representation work for de-regulation of all trucking of agricultural and food products, including immediate relaxation of back-haul regulations; further, our Congressional representation continue effort toward obtaining equitable and non-descriminatory freight rates in New England.

Objective 4: Work toward the establishment of a grain storage facility in central New England for emergency use.

Recommend that:

a. The state of New Hampshire support efforts to establish a regional grain storage program that ensures a basic feed grain supply at minimal cost, allowing unit trains and or water shipments into the region.

(Objective 5: Continue developing food and agriculture systems that depend less and less on outside inputs of fuel, imported grain, fertilizers and other chemicals, so that transportation becomes less necessary.)

MARKETING

GOAL: Enhance the food marketing systems in New Hampshire by facilitating the access of consumers to products in New Hampshire and the New England region (and for consumers to make a great effort to support this new marketing system) to benefit the producer, the consumer, and the general economic welfare of the state.

Objective 1: Assist those sectors of the food and fiber system in New Hampshire fully aware of their role in the system by describing and understanding the present system, the limitations and problems of the system, and the opportunities for improving the system.

Recommend that:

a. The State Department of Agriculture begin immediately to provide an Annual Food and Fiber report of the marketing system in New Hampshire that measures and assesses the system, analyzes the weaknesses, and provides reasoned and practical alternative solutions to the problems.

Objective 2: Provide for a more efficient and economical marketing system by promoting and instituting alternative marketing outlets and institutions which will enhance the system's ability to serve the food needs of New Hampshire consumers and producers.

Recommend that:

(a. The "Nature-ly New Hampshire" campaign be revitalized, continuing to promote and advertise New Hampshire-grown products. Continued work on the specific tasks:)

- working with wholesale/retail, hotel and institutional marketing channels to determine how producer cooperatives can market to these groups economically, efficiently, and competitively.
- providing technical assisance in the production, financial, and marketing areas.
- providing an environment which brings together the producers to form the cooperatives (and the producers to make a greater effort to work together and with buyers).
- assisting these cooperatives in becoming economically self-sufficient and independent of governmental control and involvement.
- (encourage and assist producers to comply with buyers' needs of grading, washing, packing, cooling, etc., of produce).

Objective 3: Continually assess and evaluate the problems and efficiencies of the system and continue to examine and present alternatives and solutions which will make for the most efficient and economic marketing of food products in New Hampshire.

Recommend that:

a. The extent to which state laws work to erect marketing barriers and eliminate or reduce competition by New Hampshire state institutions be examined; quality premiums be evaluated and implemented when economical. (Pass legislation which strongly encourages that state institutions buy locally grown and raised foods whenever possible, modelled on the recent Massachusetts bill).

(Objective 4: Facilitate and develop other direct marketing channels for produce, dairy, meats, etc.).

OVERALL RECOMMENDATIONS:

1. Some office, organization, or committee should conduct ongoing monitor studies of the food and agriculture system in New Hampshire, collecting up-to-date information on consumer needs, land use, agricultural production, food processing and storage, transportation and marketing, and provide appropriate feedback about various programs to state and university officials, organizations, and the public. For example, at present, very little is known about home food production and storage in New Hampshire; this information is important.

2. There should be on-going efforts to work with other New England states in an effort to cooperatively solve our similar food system problems (an example of this is the New Hampshire and Vermont cooperative marketing study, "Selling Locally Grown Produce").

3. There should be a regular forum held annually for all interested people to meet and discuss ideas and plans for developing a stable food system and to share successes and failures. This creative dialogue would foster a greater awareness of issues surrounding our food system and could function as another form of feedback to people involved in various programs and organizations, and would foster a strong, positive feeling of cooperation and working together to solve our own problems. This could be held at the university, in conjunction with the NOFA conference, or as a separate conference.

RECOMMENDATIONS FOR A NEW HAMPSHIRE FOOD POLICY: SOME GENERAL OBSERVATIONS FOUR YEARS LATER - Richard Mark*

It has been four years since the New Hampshire Legislature and New Hampshire's Governor, the late Hugh Gallen, ratified the "Recommendations for a New Hampshire Food Policy."

While there has been some progress in working towards some of the recommendations in the report, there are several major areas that still lack emphasis by local and state agricultural authorities.

1. Farm Land Preservation...while a strong and vital agriculture industry is the best method of preserving farm land, there are a number of short-term solutions, such as the buying of development rights by state government. New Hampshire is just completing its first full cycle under a very limited development rights program which has spent monies to date to preserve approximately 1,000 acres of prime farm land. The financial well is now dry, however, and attempts to have the state commit additional monies to keep the program going for another two years have failed. Given the state's precarious financial position, it is unlikely that such a program will be funded anytime in the near future. If so, there will be no established farmland preservations program in the state as of July, 1983.

State government continues to use prime farm land for the building of new state buildings, the latest example being a training academy for state police recruits, built on some of the best "river bottom" land available in Merrimack County. Coordination of state facility development and the agriculture department's priorities appear to continue to be lacking.

One bright spot in this issue is the City of Concord, New Hampshire's capitol, where the City Planning Board and City Council are soon to begin wrestling over a plan to transfer development rights for prime farm land within the city, a plan that would override other zoning laws in specific agricultural zones.

2. No major activity has taken place relative to encouraging and establishing food processing and storage facilities in the state. While the Central New Hampshire Agricultural Marketing Project will be developing a pilot project to test the feasibility of such a project in the Merrimack Valley region this fall, no other activity appears to be planned in the state. Apple growers, now facing a market glut in the next few years, are beginning to think about the need for regional storage and processing facilities, but the state has given no substantial support for such activities to date.

* Director, Central New Hampshire Agricultural Marketing Project

3. The state, due to the lack of financial resources, continues to slight the development of alternative marketing structures, although the Department of Agriculture has recently assisted the state's apple producers in the development of a statewide "marketing order". The Merrimack Growers' Co-op continues to be successful based on the energies and talents of the farmers who own and operate the Co-op. The Co-op sold over $50,000 of local produce in the Merrimack Valley during the 1983 season, thanks primarily to the support and encouragement of Shaws Corporation, a local company committed to buying local produce in northern New England.

The entire budget of the Department of Agriculture for marketing and promotions totals less than $2,000. Assistance with new marketing groups will have to continue to come from independent groups such as the Central New Hampshire Agricultural Marketing Project that gave birth to the Merrimack Growers' Coop.

Some hopeful signs: New Hampshire's recently appointed Agriculture Commissioner, Stephen Taylor, is quickly being seen as a strong advocate for New Hampshire's agricultural industry and is a strong spokesperson for diversified farming in New Hampshire.

Through the efforts of the Commissioner, an "Agricultural Forum" is being established, a forum that will bring together a variety of agricultural interests in the state on a periodic basis for the sharing of ideas and for reacting to agricultural policy development in the state

Legislative efforts, led by New Hampshire's current Governor, to "streamline" state government are threatening to break up the present Department of Agriculture and reduce its status as a major state department, thus assigning many of the Department's responsibilities to other agencies unfamiliar with the needs of local farmers. Farmers and agricultural officials are closing ranks to fight such efforts.

The most significant failure of the "food policy" work is its inability to build a public constituency for New Hampshire agriculture, a constituency that supports local agriculture in town, county and state land use battles and one that can demand that local stores buy and sell locally produced agricultural commodities. The need remains for increased educational emphasis on New Hampshire's food system and for public pressure to follow-up on the original recommendations of the food policy statement.

NOTES:

1. Stephen Kerr, Jimmy Hicks, and Robert Reece, Selling Locally Grown Produce (Concord: New Hampshire Department of Agriculture, 1982), p.1.
2. _____, And When We Went There, The Cupboard Was...Bare, (Durham: New Hampshire Cooperative Extension Service, n.d.), p. 1.
3. See chart. About 20% of food expenditures remain with New Hampshire's retailers.
4. _____, State of Your Food (Emmaus: Cornucopia Project, 1983), p. 27.
5. U.S. Department of Commerce, Bureau of the Census, 1978 Census of Agriculture, Part 51 (Washington, D.C.: GPO, 1980), p. 401.
6. Pilgrim and Peterson, Soils of New Hampshire, Report No. 79 (Durham: University of New Hampshire, 1979).
7. Luloff, Ilvento, and Israel, New Hampshire's Changing Population, Research Report No. 87 (Durham: University of New Hampshire, 1980), pp. 4-5.
8. Ibid.
9. Ibid.
10. Coppelman, Pilgrim, and Peschel, Agriculture, Forest and Related Land Use in New Hampshire, 1952 - 1975, Research Report No. 64 (Durham: University of New Hampshire, 1978), p.i.
11. Ibid.
12. Ibid.
13. Ibid.
14. Ibid.
15. U.S. Department of Agriculture, Agricultural Research Service, Miscellaneous Publication No. 1422, Research for Small Farms, Proceedings of the Special Symposium (Washington, D.C.: GPO, 1982), p. 27.
16. Pilgrim and Peterson.

17. USDA, Soil Conservation Service, America's Soil and Water: Condition and Trends (Washington, D.C.: GPO, 1980), p. 8.

18. Telephone interview with Linda Farmer, USDA Economic Research Service, January 1983.

19. ____, New Hampshire Agricultural Statistics 1980 (Concord: New Hampshire, Department of Agriculture, 1981), p. 31.

20. Ibid.

21. USDA, Agricultural Statistics 1981 (Washington, D.C.: GPO, 1981), p. 470.

22. USDA, Economics, Statistics and Cooperatives Service, Statistical Bulletin No. 632, Energy and U.S. Agriculture: 1974 and 1978 (Washington, D.C.: GPO, 1980), p. 42.

23. Ibid.

24. Ibid.

25. USDA, Crop Reporting Board, Statistical Reporting Service, Commercial Fertilizer Use For The Year Ended June 30, 1980 (Washington, D.C.: GPO, 1980), pp. 8, 9; USDA Crop Reporting Board, Statistical Reporting Service, Commercial Fertilizer Use For The Year Ended June 30, 1981 (Washington, D.C.: GPO, 1981), pp. 8, 9.

26. Ibid.

27. Alan T. Eaton, "IPM Evaluated In New Hampshire" The Natural Farmer, Spring 1982.

28. New Hampshire Agricultural Statistics 1981.

29. Andrews and Stein, Resources and Technology of New Hampshire Dairy Farms, Research Report No. 83 (Durham: University of New Hampshire, 1980).

30. Durgin, Henry, Kay, and Nelson, New Hampshire Agriculture and Forest Industries Part I, Dairy and Beef Research Report No. 50 (Durham: University of New Hampshire, 1979), p. 24.

31. Ibid.

32. Ibid.

33. Andrews and Stein, p. i.

34. _____, "Cheese Is Something to Smile About," New Hampshire Times, 12, No. 32 (1982), p. 5.

35. Durgin, Henry, Kaye and Leighton, New Hampshire Agriculture and Forest Industries, Part II, Sheep and Swine Industries in New Hampshire, Research Report No. 67 (Durham: University of New Hampshire, 1978), p. 31.

36. Ibid.

37. Ibid., p. 32.

38. Andrews and Danko, Resources and Technology on New Hampshire Poultry Farms, Research Report No. 89 (Durham: University of New Hampshire, 1981).

39. Ibid.

40. Ibid., p. 2.

41. Ibid., p. i.

42. Andrews, Leighton and Latremore, Marketing Agricultural Products in New Hampshire, Part VII, Vegetable Market Structure and Expansion Potential, Research Report No. 55 (Durham: University of New Hampshire; 1977), p. 11.

43. _____, Agriculture and the Local Economy, fact sheet (Concord: New Hampshire Department of Agriculture, 1981).

44. New Hampshire Agricultural Statistics 1980, p. 30.

45. Andrews, Leighton and Latremore.

46. Agriculture and the Local Economy.

47. Ibid.

48. New Hampshire Agricultural Statistics 1980, p. 30.

49. The Gallup Organization, 1980-81 National Gardening Survey (Burlington: Gardens for All, 1980), p. 29.

50. Information from the Central New Hampshire Agricultural Marketing Project, Concord.

51. National Marine Fisheries Service, Resource Statistics Division 9/8/82.

52. Letter received from Sarah Dunlop, Fisheries Biologist, New Hampshire Fish and Game Department.

53. U.S. Department of Commerce, National Marine Fisheries Service, Fisheries of the United States 1981 (Washington, D.C.: GPO, 1982), p. 95.

54. Andrews, Leighton and Latremore, p. 11.

55. Kerr, Hicks and Reese, p. 20.

56. Ibid.

57. _____, *Marketing Alternatives for Small Farmers: Fruits and Vegetables* (Muscle Shoals: Tennessee Valley Authority, n.d.), p. 5.

58. Ibid., pp. 19 - 20.

59. Kerr, Hicks, and Reese, pp. 11 - 13.

60. *Dalton and Andrews, Marketing Agricultural Products*, Part IX, *Sales Patterns in Roadside Markets*, Research Report No. 79, (Durham: University of New Hampshire, 1979).

61. _____, *Recommendations for a New Hampshire Food Policy* (n.p.: n.p., 1979).

62. *The Monthly Communicator* (newsletter of the New Hampshire Farm Bureau), January 1983.

63. _____, "Can Agriculture Survive in the Northeast?" *Farmland*, 2, No. 6 (1982), p. 1.

64. Natural Organic Farmers' Association conference handbook, July 1982.

65. _____, "Farming -- New Fields of Marketing", *New Hamsphire Times*, 12, No. 22, (1982), p. 12.

66. Promotional information from The Rural Educational Center, Inc. Stonyfield Farm, Wilton, New Hampshire.

67. Friends of Agriculture newsletter, Dover, New Hampshire.

68. *The Monthly Communicator*.

69. *Recommendations for a New Hampshire Food Policy*.

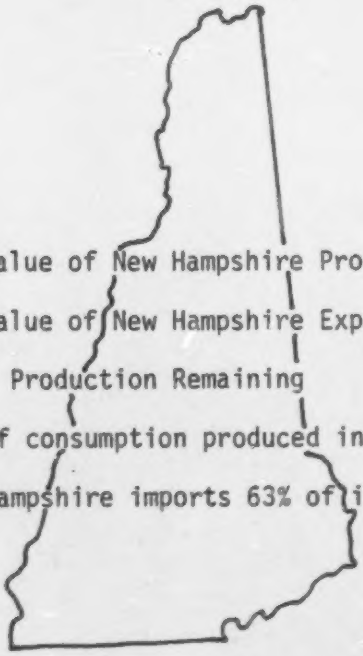
70. Ibid. p. 15.

71. Harter, *A Survey of New Hampshire Sewage Sludges as Related to Their Suitability for On-Land Disposal*, Bulletin No. 503 (Durham: University of New Hampshire, 1975); Leighton, Harter and Grambie, *Sewage Sludge Composting in Small Towns*, Bulletin No. 508 (Durham: University of New Hampshire, 1978).

APPENDIX

Broken down stone fences and old cellar holes are often the only evidence left of New Hampshire's agricultural heritage. During the late 1700's and early 1800's, grains, fruits, vegetables and livestock were all produced in New Hampshire, with surpluses being sent to the urban markets of Boston, New York, and Philadelphia. Only one hundred years ago, New Hampshire agriculture supported 32,000 farms. However, as the country's transportation system was expanded, New Hampshire farmers couldn't complete with the long growing seasons and deep fertile soils of the mid- and southwest. Many farmers left New Hampshire or went out of business. Soon, most of the food New Hampshire residents consumed was trucked in from all around the country.

Since the mid-1970's, the ways our food is produced, processed and brought to us have been an important concern in New Hampshire. Public and private organizations have started to work together to find ways to develop a sustainable food system for New Hampshire. Producing more food in-state provides income for New Hampshire's farmers and food processors, and provides consumers with fresh, moderately priced food. There is still much to be done to make New Hampshire's food system sustainable. Farmland must be preserved for agricultural use. Processing and storage facilities are needed to keep surpluses through the long winter. Consumers should learn the benefits of home food production and preservation techniques. These are just a few of the steps that will help New Hampshire develop a safe, affordable, economical food system.



Retail Value of New Hampshire Production	$950,936,500
Retail Value of New Hampshire Exports	357,324,500
Value of Production Remaining	$593,612,000

37% of consumption produced in New Hampshire

New Hampshire imports 63% of its food.

NEW HAMPSHIRE FOOD IMPORTS

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight (1,000 lbs.)	Retail Value	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NH Consumption
Meats									
Beef and Veal	7,738.50	20,932.8	71,807.6	195,833.1	89	169;611.4[a]			522,231[b]
Lamb and Mutton	200.2	422.3	1,196.8	2,252.2	83.3	1,876:1			10,566
Pork	2,291.9	3,552.4	63,061.8	97,682.7	96.4	94,166.1			44,844
Poultry									
Chicken	3,209.8	2,311	46,030.6	33.694.3	93	31,335.7			1,973
Turkey	448	439	9,666.4	9,463.4	95.4	9,028.1			6,732
Eggs	20,497.2	11,867.9	31,853.1	18,442.9					15,585
Fish (fresh, frozen, cured)	4,614[c]	10,704.5	11,691.7	27,124.9	61	16,546.2			
Dairy Products									
Butter	-0-		4,050.7	8,077	100	8,077.1			
Cheese, hard	10.4[d]		16,202.7	37,590.4	99.94	37,567.8			
cottage	-0-		40,967.1	37,280.1	100	37,280.1			
Evaporated and condensed milk	-0-		6,536.3	4,588.5	100	4,588.5			59,436[e]
Fluid milk and cream	344,000[f]	808,400	209,899.1	498,262.8			39	315,276	
Frozen dairy products	4,948[f]	19,940.4	17,031.3	68,653.1	71	48,743.7			
Vegetables, fresh[g]									
Artichokes	-0-		276.2	104.95	100	104.9			
Asparagus	360	385.2	276.2	295.5			23.3[h]	89.7	138
Broccoli	100	820	1,567	1,284.9	94	1,207.8			180
Cabbage	3,600	864	7,733.1	1,886.9	53	1,000			348
Carrots	126	46.6	5,615.7	2,055.4	97.7	2,008.1			208
Cauliflower	240	196.8	1,196.8	981.4	80	785.1			122
Celery	22.2	9.3	6,720.5	2,842.8	99.7	2,834.3			851
Cucumbers	2,000	1,020	3,682.4	1,892.8	46	870.7			326

continued on next page

NEW HAMPSHIRE FOOD IMPORTS (cont.)

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight (1,000 lbs.)	Retail Value	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NH Consumption
Vegetables, fresh									
Eggplant	96	43.2	460.3	207.1	79	163.6			25
Escarole	NC		552.4	198.8					43
Garlic	NC		736.5	1,348.5					57
Green pepper	420	411.6	3,038	2,998.5	86	2,578.7			307
Lettuce	700	343	22,923.2	11,186.5	97	10,850.9			873
Mushrooms	NC		819.3	1,427.3					
Onion and Shallots	120	48	9,390.2	3,754.2	99	3,716.6			317
Potatoes	137,500	34,375	45,386.1	11,328.4			67^h	23,031.2	1,739
Snap beans	1,200	876	1,196.8	878.4					374
Spinach	200	232	644.4	747.5	69	515.7			86
Sweet corn	NC		6,076	2,339.3					769
Sweet potatoes	-0-		3,130.1	845.1	100	845.1			
Tomatoes	1,584	1,219.7	10,531.8	8,108.4	85	6,892.1			524
Vegetables, processed									
Asparagus, frozen	-0-		55.2	145.3	100	145.3			60
canned	-0-		276.2	576.5	100	576.5			169
Beets, canned	-0-		1,104.7	345.8	100	345.8			46
Broccoli, frozen	-0-		1,288.9	786.2	100	786.2			256
Brussel Sprouts, frozen	-0-		230.2	147.3	100	147.3			25
Carrots, frozen	-0-		856.2	847.6	100	847.6			53
canned	-0-		460.3	248.6	100	248.6			23
Cauliflower, frozen	-0-		423.5	498.9	100	498.9			98
Corn, frozen	-0-		1,775.8	1,140.4	100	1,140.4			807
canned	-0-		5,339.6	2,189.2	100	2,189.2			1,175
Lima beans, frozen	-0-		276.2	251.3	100	251.3			143
canned	-0-		432.7	237.9	100	237.9			112
Mushrooms, canned	-0-		1,233.6	4,650.7	100	4,650.7			
Onions, frozen	-0-		626	563.4	100	563.4			25
Peas, frozen	-0-		1,417.7	1,034.9	100	1,034.9			1,293
canned	-0-		3,038	1,427.9	100	1,427.9			879

continued on next page

NEW HAMPSHIRE FOOD IMPORTS (cont.)

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight (1,000 lbs.)	Retail Value	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (198r dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NH Consumption
Pickles, canned	1,500[1]		6,352.2	4,700.6	76	3,572.5			453
Potatoes, frozen	-0-		15,559.3	9,770.6	100	9,770.6			1,323
canned	-0-		1,196.8		100				72
Pumpkin & Squash canned	-0-		368.2	228.3	100	228.3			
Saurkraut	-0-		1,104.7	441.9	100	441.9			44
Snap beans, frozen	-0-		920.6	672	100	672			22
canned	-0-		5,707.8	2,568.5	100	2,568.5			736
Southern greens, frozen	-0-		220.9	190	100	190			
Spinach, frozen	-0-		690.4	548.9	100	548.9			45
canned	-0-		460.3	234.7	100	234.8			27
Sweet potatoes	-0-		920.6	552.4	100	552.4			
Tomatoes, whole	-0-		5,615.7	2,852.8	100	2,852.8			185
pulp & puree	-0-		736.5	374.1	100	374.1			24
catsup, paste, sauce	-0-		8,745.8	6,384.4	100	6,384.4			288
juice, & veg. juice	-0-		2,945.9	854.3	100	854.3			97
Other, canned	-0-		2,025.3		100				
Fruits, fresh									
Apples	44,982	25,414.8	14,729.8	8,322.3			67	17,027.9	1,386
Bananas	-0-		19,148.7	6,931.8	100	6,931.8			
Blueberries	2,000								
Cherries	-0-		552.4	679.4	100	679.4			
Citrus, Grapefruit	-0-		7,180.8	2,836.4	100	2,836.4			
Lemon/Lime	-0-		2,117.4	1,481.1	100	1,481.1			
Oranges/Tangerines	-0-		15,640.4	6,240.5	100	6,240.5			
Tangelos	-0-		644	399.5	100	399.5			
Grapes	180[1]	187.2	3,341.2	3,474.8	94.6	3,287.2			
Melons	240	21.6	15,558.3	1,400.2	98.5	1,379.2			1,944
Peaches/nectarines	400	220.8	6,444.3	3,557.3	93.8	3,336.7			816
Pears	475	280.3	2,209.5	1,303.4	78.5	1,023.2			320
Plums & prunes	-0-		1,380.9	359	100	359			1,751
Raspberries	100	125							
Strawberries	3,000	2,943	1,565	1,535.3			47.8	1,406.7	313

continued on next page

NEW HAMPSHIRE FOOD IMPORTS (cont.)

COMMODITY	PRODUCTION Retail Weight (1,000 lbs.)	Retail Value	CONSUMPTION Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1981 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NH Consumption
Fruits, processed									
Frozen fruits	NC		2,550.1	3,238.6					
Frozen citrus juices	-0-		11,664.1	16,327.5	100	16,327.5			
Canned & chilled fruits	NC		16,202.7	8,587.4					
Canned & chilled fruit juices	NC		15,908.1	6,204.2					
Dried fruits	NC		2,706.6	4,492.9					
Grains and Legumes									
Barley	-0-		1,104.7	541.3	100	541.3			429[k]
Corn flour & meal	-0-		6,904.6	3,176.1	100	3,176.1			
Corn cereal	-0-		2,117.4	3,091.4	100	3,091.4			1,923 (all corn flour
Corn starch	-0-		1,749.2	979.5	100	979.5			
Oats	-0-		2,853.9	2,054.8	100	2,054.8			1,889
Rice	-0-		8,561.7	4,820.2	100	4,820.2			
Rye	-0-		644.4	167.6	100	167.6			470
Soybeans (grits & flour)	-0-		1,841.2	1,270.4	100	1,270.4			1,145
Wheat flour	-0-		107,711.4	241,811.2	100	241,811.2			
Wheat cereal	-0-		2,577.7	3,660.3	100	3,660.3			69,962 (all wheat)
Dry beans	NC		5,983.9	4,009.3					
Dry peas	NC		368.2	147.3					
Fats & Oils									
Lard	190.4	131.4	2,301.5	1,588.1	92	1,461			
Margarine	-0-		10,310.8	7,609.4	100	7,609.4			
Shortening	-0-		16,847.1	13,107.9	100	13,107.9			
Other oils	-0-		20,897.8	18,808.1	100	18,808.1			108,957[l]

continued on next page

NEW HAMPSHIRE FOOD IMPORTS (cont.)

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight (1,000 lbs.)	Retail Value	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of Consumption
Sweetners									
Cane & beet sugars	-0-		76,963	30,777.5	100	30,777.5			16,034[m]
Honey	92	147.2	1,104.7	1,778.6	92	1,636.3			
Maple syrup (gal.)	105	2,004.5	92.1	1,757.1			12.3	246.5	
Corn syrup	-0-		37,008.5	27,016.2	100	27,016.2			
Molasses & other syrups	-0-		460.3	764.1	100	764.1			
Other									
Coffee	-0-		7,180.8	18,167.3	100	18,167.3			
Tea	-0-		736.5	905.9	100	905.9			
Cocoa	-0-		2,393.6	8,760.5	100	8,760.5			
Tree nuts	-0-		1,583.5	5,272.9	100	5,272.9			
Peanuts	-0-		580[n]	1,322.4	100	1,322.4			
TOTALS	589,490.6	950,936.5	1,194,778.	1,621,860.46		978,995.6		357,324.5	

NOTES NEW HAMPSHIRE FOOD IMPORTS CHART

Statistics from: USDA, Agricultural Statistics 1981 (Washington, D.C.: GPO, 1981); New England Crop and Livestock Reporting Service, New Hampshire Agricultural Statistics 1980 (Concord: New Hampshire Department of Agriculture,1981); USDA, Economic Research Service, Statistical Bulletin No. 672 Food Consumption, Prices and Expenditures (Washington, D.C.: GPO,1981).

a. Retail Value for beef imports only.

b. Includes acreage required for beef consumption only. Veal acreage is included in dairy acreage.

c. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Fisheries of the United States 1981 (Washington, D.C.: GPO, 1981). Retail weight is estimated to be 60 percent of liveweight.

d. There is one cheesemaker in New Hampshire.

e. Durgin, Henry, Kaye and Nelson, New Hampshire Agriculture and Forest Industries, Part I, Dairy and Beef (Concord: University of New Hampshire, 1976). Includes all dairy products and veal.

f. 1980 data.

g. Fresh vegetable production from Otho Wells, Cooperative Extension Service, through Carol Houghtaling, Moving Toward a Goal: Food Self-Sufficiency for New Hampshire, 1982.

h. In fact, New Hampshire both imports and exports these crops, depending on the season. This is true of other food items as well.

i. One processor in New Hampshire produces piccalilli and relish.

j. Fruit production from William Lord, Cooperative Extension Service, University of New Hampshire.

k. Barley, oats and wheat acreage based on yields reported in "Small Grains," New England Farmer, June 1982.

l. Acreage required if all oil is soybean oil.

m. Based on yield of 4,600 pounds of refined sugar, (from beets) per acre.

n. Based on 1977 per capita consumption.

A Partial List of Who's Who in New Hampshire Agriculture

(compiled by the New Hampshire Department of Agriculture)

New Hampshire Department of Agriculture
Howard Townsend, Commissioner
Park Plaza, 85 Manchester Street
Concord, NH 03301
(603) 271-3551

College of Life Science and Agriculture
University of New Hampshire (UNH)
Durham, NH 03824
(603) 862-1450

Cooperative Extension Service
Maynard Heckel
Associate Dean and Director
University of New Hampshire
Durham, NH 03824

Agricultural Stabilization and
Conservation Service
Peter Thomson, Executive Director
Federal Building
P.O. Box 1398
Concord, NH 03301
(603) 224-7941

New Hampshire State Association
of Conservation Districts
Allen Bartlett, Treasurer/Secretary
Rt. 10, Box 183
Concord, NH 03301
(603) 225-3498

Soil Conservation Service
Richard Porter
Federal Building
Box G
Durham, New Hampshire 03824
(603) 868-7581

State Conservation Committee
Robert Yeaton, Chairman
RFD 28
Epsom, New Hampshire 03234
(603) 736-9084

New Hampshire Horticultural Society
Elizabeth Corell, Secretary
New Hampshire Department of Agriculture
85 Manchester Street
Concord, NH 03301

Central New Hampshire Agricultural
Marketing Project
77 N. Main Street
Concord, NH 03301
(603) 225-4708

Friends of Agriculture
c/o Strafford County Coop Ext. Service
County Farm Road
Dover, NH 03820

Merrimack Growers Coop
Katherine Graham, Manager
P.O. Box 7241
Concord, NH 03301
(603) 225-3298

Natural Organic Farmers Association
Gary Olson, Coordinator
P.O. Box 42
Mt. Sunapee, NH 03772
(603) 763-4488

New Hampshire Farm Bureau Federation
Maurice Chapman, Executive Secretary
RFD #4, Box 344D
Concord, NH 03301
(603) 224-1934

New Hampshire Farm Museum, Inc.
John Heath, Secretary
P.O. Box 644
Milton, NH 03850
(603) 652-7840

New Hampshire Maple Producers Association
John Conde, Secretary
RFD #7, Box 9
Penacook, New Hampshire 03303
(603) 225-5505

New Hampshire State Grange
Wayne Ingalls, Secretary
P.O. Box 5035
Manchester, New Hampshire 03108
(603) 669-0391

Northeast Egg Marketing Association
William S. Rent, Manager
17 Madbury Road
P.O. Box MM
Durham, New Hampshire 03824
(603) 868-2842

U.S. Statistical Reporting Service
(NECLRS)
Beverly LaCroix, Secretary
6 Loudon Road Rm 203
Concord, NH 03301
(603) 224-9639

Seacoast Growers Association
David Moriarty
144R Winnicut
Stratham, NH 03885
(215) 778-8141

New England Beef Association
Debra Lambert, Secretary
Rt. 175, RFD #3
Holderness, NH 03245
(603) 536-1203

New England Sheep Marketing Project
Lynda Brushett
RFD 1, Box 835
Epping, New Hampshire 03042
(603) 679-2150

New Hampshire Dairy Goats Association
Ellen Merry, Secretary
Rt. 1
Mountain Road
Raymond, NH 03077
(603) 895-3949

New Hampshire Poultry Growers Association
RFD 1
Kingston, NH 03848
(603) 642-5500

New Hampshire Sheep Breeders Association
Thedra Farm
Antrim, NH 03440
(603) 558-6592